Installation & Maintenance Data

IM 985-1

Group: WSHP

Part Number: 669544301

Date: January 2010

Console Water Source Heat Pumps

R-410A Models MHC Standard Range & MHW Geothermal Range

Flat Top & Slope Top – Unit Sizes 007 – 018

Slope Top Unit

Flat Top Unit

McQuay® Air Conditioning

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Model Nomenclature

NOTE: For illustration purposes only. Not all options available with all models.
Please consult McQuay Sales Representative for specific availability.

W MHC 1 009 B E H B T 01 F2

Product Category
W = WSHP

Product Identifier
MHC = Standard Range Console WSHP
MHW = Geothermal Range Console WSHP

Design Series
1 = A Design
2 = B Design
3 = C Design
4 = D Design

Nominal Capacity
007 = 7,000 BTU/h
009 = 9,000 BTU/h
012 = 12,000 BTU/h
015 = 15,000 BTU/h
018 = 18,000 BTU/h

Controls
B = MicroTech III Unit Controller
C = MicroTech III Unit Controller w/LONWORKS Communication Module
D = MicroTech III Unit Controller w/BACnet Communication Module

Voltage
A = 115/60/1
E = 208-230/60/1
J = 265/60/1

Cabinet Type
F = Flat Top
S = Slope Top

Discharge Grille
2 = Standard Stamped Louver
3 = Multi-Directional Grille

Blower Motor
01 = Standard

Discharge Air
T = Top

Return Air
B = Bottom Return (High Sill)
F = Front Return (Low Sill)

Cabinet Height
H = High Sill
L = Low Sill

⚠ WARNING

This Installation and Maintenance bulletin is intended to provide the proper procedures for installing a McQuay Console Water Source Heat Pump. Failure to follow these procedures can cause property damage, severe personal injury or death. Additional, failure to follow these procedures can cause premature failure of this equipment or cause erratic unit operation, resulting in diminished unit performance. Disregarding these directions may further lead to suspension or revocation of the manufacturer's warranty.

Receiving and Storage

Upon receipt of the equipment, check carton for visible damage. Make a notation on the shipper's delivery ticket before signing. If there is any evidence of rough handling, immediately open the cartons to check for concealed damage. If any damage is found, notify the carrier within 48 hours to establish your claim and request their inspection and a report. The Warranty Claims Department should then be contacted.

Do not stand or transport the machines on end. For storing, each carton is marked with "up" arrows.

In the event that elevator transfer makes up-ended positioning unavoidable, do not operate the machine until it has been in the normal upright position for at least 24 hours.

Temporary storage at the job site must be indoor, completely sheltered from rain, snow, etc. High or low temperatures naturally associated with weather patterns will not harm the units. Excessively high temperatures, 140°F (60°C) and higher, may deteriorate certain plastic materials and cause permanent damage.

IMPORTANT

This product was carefully packed and thoroughly inspected before leaving the factory. Responsibility for its safe delivery was assumed by the carrier upon acceptance of the shipment. Claims for loss or damage sustained in transit must therefore be made upon the carrier as follows:

VISIBLE LOSS OR DAMAGE

Any external evidence of loss or damage must be noted on the freight bill or carrier's receipt, and signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier's refusal to honor a damage claim. The form required to file such a claim will be supplied by the carrier.

CONCEALED LOSS OR DAMAGE

Concealed loss or damage means loss or damage which does not become apparent until the product has been unpacked. The contents may be damaged in transit due to rough handling even though the carton may not show external damages. When the damage is discovered upon unpacking, make a written request for inspection by the carrier's agent within fifteen (15) days of the delivery date and file a claim with the carrier.

Pre-Installation

⚠ WARNING

The installer must determine and follow all applicable codes and regulations. This equipment presents hazards of electricity, rotating parts, sharp edges, heat and weight. Failure to read and follow these instructions can result in property damage, severe personal injury or death. This equipment must be installed by experienced, trained personnel only.

1. To prevent damage, do not operate this equipment for supplementary heating and cooling during the construction period. Doing so will void the warranty.
2. Inspect the carton for any specific tagging numbers indicated by the factory per a request from the installing contractor. At this time the voltage, phase and capacity should be checked against the plans.
3. Check the unit size against the plans to verify that the unit is being installed in the correct location.
4. Before installation, check the available dimensions where the unit be installed versus the dimensions of the unit.
5. Note the location and routing of water piping, condensate drain piping, and electrical wiring. The locations of these items are clearly marked on submittal drawings.
6. The installing contractor will find it beneficial to confer with piping, sheet metal, and electrical foremen before installing any unit.

***Note:** Check the unit data plate for correct voltage with the plans before installing the equipment. Also, make sure all electrical ground connections are made in accordance with local code.*

7. The contractor shall cover the units to protect the machines during finishing of the building. This is critical while spraying fireproofing material on bar joists, sandblasting, spray painting and plastering. Damage to the unit due to a failure to protect it during finishing of the building is not covered by the warranty.

Table 1. Physical Data

Unit Size		007	009	012	015	018
Fan Wheel - D x W (In.)		4.33 x 27.24	4.33 x 27.24	4.33 x 27.24	4.33 x 35.43	4.33 x 35.43
Fan Motor Horsepower		1/30	1/30	1/30	1/18	1/18
Coil Face Area (Sq. Ft.)		1.67	1.67	1.67	2.22	2.22
Coil Rows		2	2	3	2	3
Refrigerant Charge (Oz.)		18.2	19.2	22	29.9	32
Filter, (Qty.) Size (In.)	Low Sill	(1) 23.75 x 8.75			(1) 31.75 x 8.75	
	High Sill	(1) 29.25 x 9.75			(1) 37.25 x 9.75	
Water Connections, Female NPT (In.)		5/8 O.D.	5/8 O.D.	5/8 O.D.	5/8 O.D.	5/8 O.D.
Condensate Connections, Female NPT (In.)		3/4 I.D.	3/4 I.D.	3/4 I.D.	3/4 I.D.	3/4 I.D.
Weight, Operating (Lbs.)		138	144	146	166	171
Weight, Shipping (Lbs.)		158	164	166	196	201

Unit Installation (Recommended)

⚠ WARNING

Installation and maintenance are to be performed by qualified personnel who are familiar with local codes and Regulations, and experienced with this type of equipment.

⚠ CAUTION

Sharp edges can cause personal injury. Avoid contact with them.

1. Consult job blueprints for unit location. Clean area where unit is to be installed, removing all construction dirt and debris.
2. Remove the unit from the shipping carton and save the carton to be used as a protective cover after the installation is complete.
3. Remove the screws (numbered 1) shown in Figure 1, securing the right and left side /corner panels to the subbase. Lift the panels up and out until the bottom tab clears the slot in the subbase.

Note: *Set the unit panels aside where they will not be damaged.*

4. Remove the two screws (numbered 2) in Figure 1 securing the front panel to the subbase and remove the panel by lifting up and tilting out until the panel tabs clear the slots in the subbase.

Note: *If using the Alternate Unit Installation procedure (Using Mounting Brackets, page 6) it is not necessary to remove the top section. Continue with step 5 if using the recommended method of installation.*

5. Open the control door and remove the four screws that hold the top panel and control pad in place (numbered 3) in Figure 1. On the opposite end of the cabinet top lift off the blank-off plate to the right and remove the last two mounting screws (numbered 4) in Figure 1. Lift the top panel off, turning the control pad so that it fits down through the opening in the top panel.

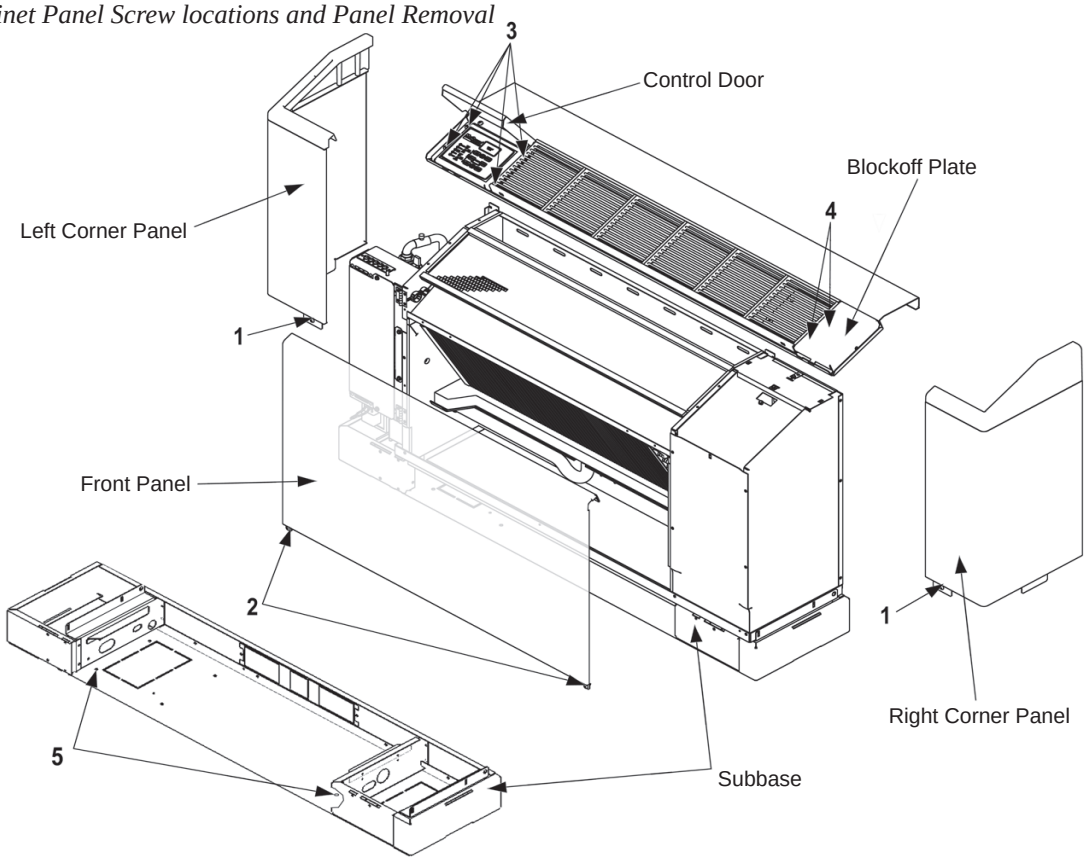
Note: *After removing the panels, set aside in a safe area where they will not be damaged.*

STOP! *If an outside air damper kit is to be installed, refer to IM 974 for the manual damper and the motorized damper kit and install it now.*

6. Position the chassis/subbase against the wall where the unit is to be installed. Remove any mouldings at the floor or wall (see letter A in Figure 2). Allow adequate room for piping and electrical connections in the subbase by checking the electrical connection end of the subbase and chassis.

Note: *Make sure electrical and piping connections are in the proper location within the subbase end piping compartment.*

Figure 1. Cabinet Panel Screw locations and Panel Removal



7. Remove the filter and locate the existing 1/4" mounting holes in the bottom of the subbase labeled (5) in Figure 2 subbase detail.

8. Be sure the subbase is tight to the wall. Transfer a mark with a marker or pencil to the floor at mounting hole locations (5).

9. Move unit away to pre-drill 1/4" mounting holes in the floor at marked locations.

IMPORTANT

Clean unit mounting area of all construction debris. Check that the floor is level and at 90 degrees to the wall as shown in Figure 2.
McQuay recommends the placement of a sound absorbing mat beneath the unit footprint before continuing to the next installation step.

Note: *Use the appropriate fasteners by others in accordance with local building codes.*

10. Insert fasteners through the mounting holes in the subbase and secure the subbase to the floor, tightening the fasteners. Do not over-tighten fasteners and distort or warp the subbase plate.

11. Use a carpenters square and level to check that the unit is level and 90-degrees to the wall and floor (see letters C & D in Figure 2).

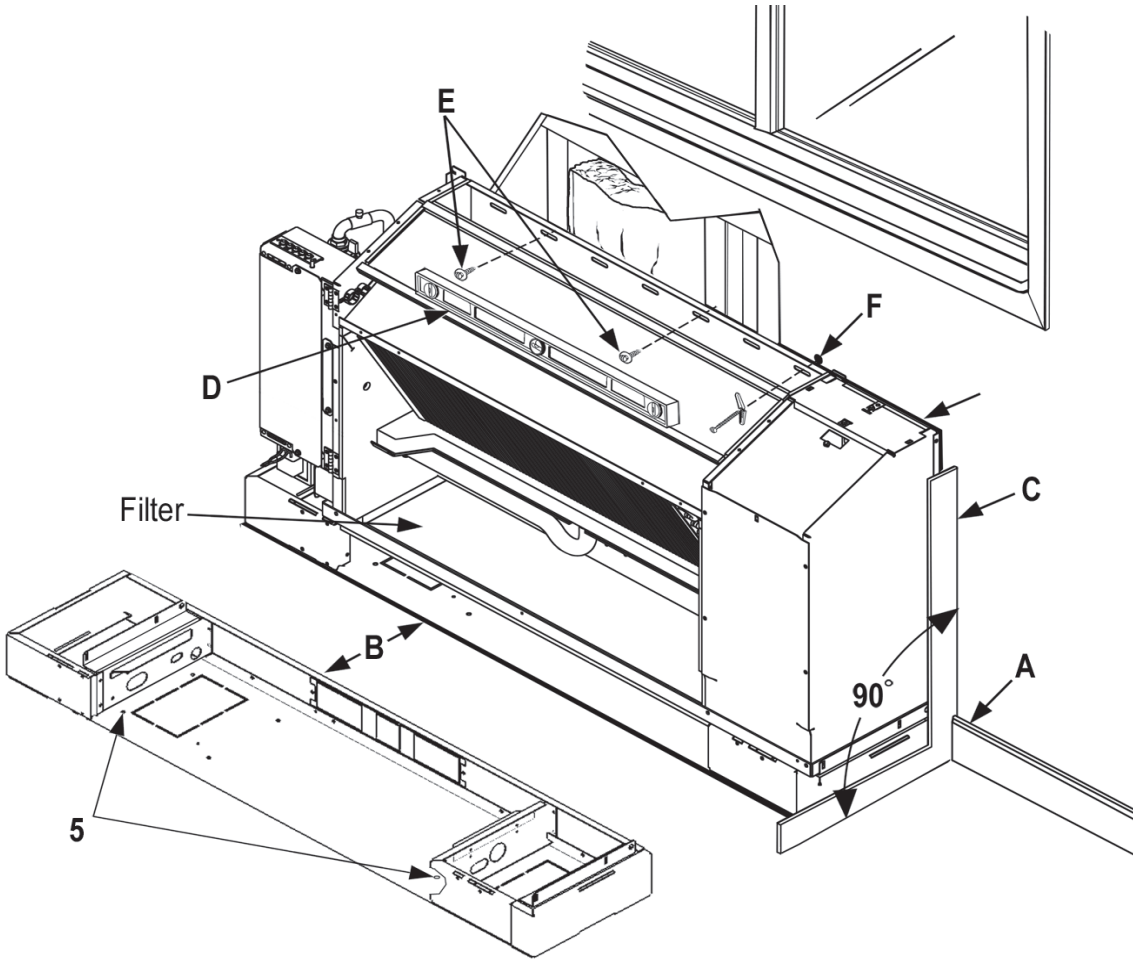
12. The chassis back panel has a series of slots on the back flange to mount the assembly to the wall. It is the installing contractor's responsibility to select the correct fasteners for each unit to meet local codes (see letter E in Figure 2).

Note: *Use a minimum of three fasteners to secure the unit (field supplied). Secure two fasteners into wall studs.*
At location(s) where no stud is present, secure with a Toggle bolt or equivalent (by others) (see letter F in Figure 2).

13. Reinstall the panels in reverse order as performed in steps 3 through 5 on page 4.

14. Cut out one side and the bottom of the shipping carton, leaving the top and three sides to place over the unit for protection during construction.

Figure 2. Unit Mounting Details



Alternate Unit Installation (Using Provided Brackets)

Procedure

1. With the front, left and right cabinet panels removed, set the entire unit in its final mounting position.
2. With the chassis still mounted on the subbase, remove filter to allow access to the subbase bottom plate.
3. Locate the existing 1/4" mounting holes in the bottom of the subbase labeled (5) in Figure 3.

Note: *Make sure electrical and piping connections are in the proper location within the subbase end piping compartment.*

4. Transfer a mark with a marker or pencil to the floor at mounting hole locations (5).
5. Move unit away to pre-drill 1/4" mounting holes in the floor at marked locations.

IMPORTANT

Clean unit mounting area of all construction debris. Check that the floor is level and at 90 degrees to the wall as shown in Figure 2, page 5
McQuay recommends the placement of a sound absorbing mat beneath the unit footprint before continuing to the next installation step.

Note: *Use the appropriate fasteners by others in accordance with local building codes.*

STOP! *If an outside air damper kit is to be installed, refer to IM 974 for the manual damper and the motorized damper kit and install it now.*

6. Insert fasteners through the mounting holes in the subbase and finish securing the unit to the floor, tightening the fasteners. Do not over-tighten fasteners and distort or warp the subbase plate.
7. Locate mounting brackets at locations at the wall as shown in Figure 3.

Note: *Brackets should be located approximately 3" from the top of the chassis, or lower if clearance is necessary to fasten bracket.*

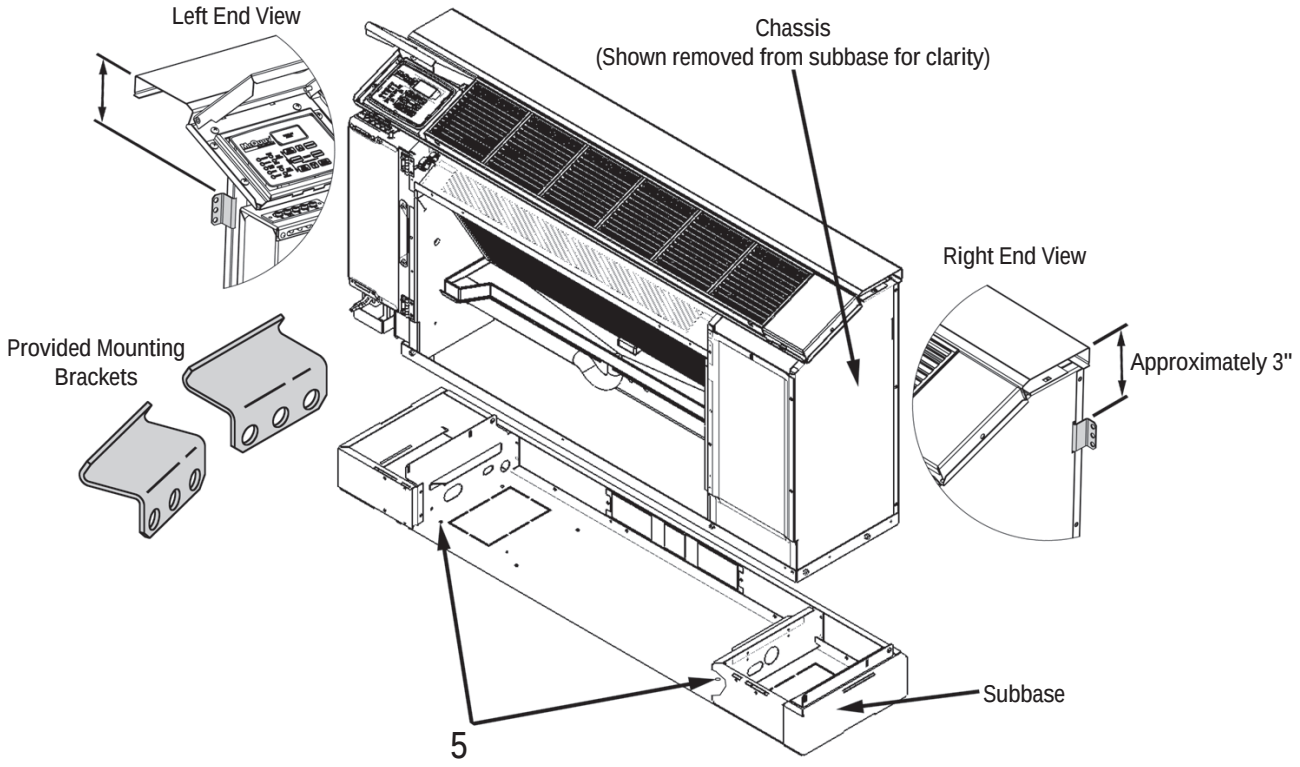
8. Mark the position of the bracket mounting holes onto the wall. Remove the brackets and using a pre-set depth drill, pre-drill holes to accept a wall anchor (by others).

⚠ WARNING

Failure to use a pre-set depth drill could result in serious injury or death.

Note: *It is preferred that the brackets are screwed directly into a stud where available. However, drywall anchors can be utilized when studs are absent at bracket locations. It is the responsibility of the installing contractor to provide the appropriate fasteners and anchors to ensure that the unit is secured properly.*

Figure 3. Mounting Bracket Installation



Piping

1. Connect units to supply and return piping in a two-pipe reverse return configuration (Figure 4).
   A reverse return system is inherently self-balancing and requires only trim balancing where multiple quantities of units with different flow and pressure drop characteristics are connected to the same loop. A simple way to check for proper water balance is to take a differential temperature reading across the water connections when in the cooling mode. To achieve proper water flow, the differential should be 10°F to 14°F (-5°C to -8°C).
   A direct return system may also be acceptable, but proper water flow balancing is more difficult to achieve and maintain.

2. The piping can be steel, copper or PVC, but must comply with local codes.

3. Supply and return run outs are typically connected to the unit by short lengths of high pressure flexible hose which are sound attenuators for both unit operating noise and hydraulic pumping noise.

Note: *Be sure that one end of the hose has a swivel fitting to facilitate removal for service. Hard piping to the unit can result in added operating noise.*

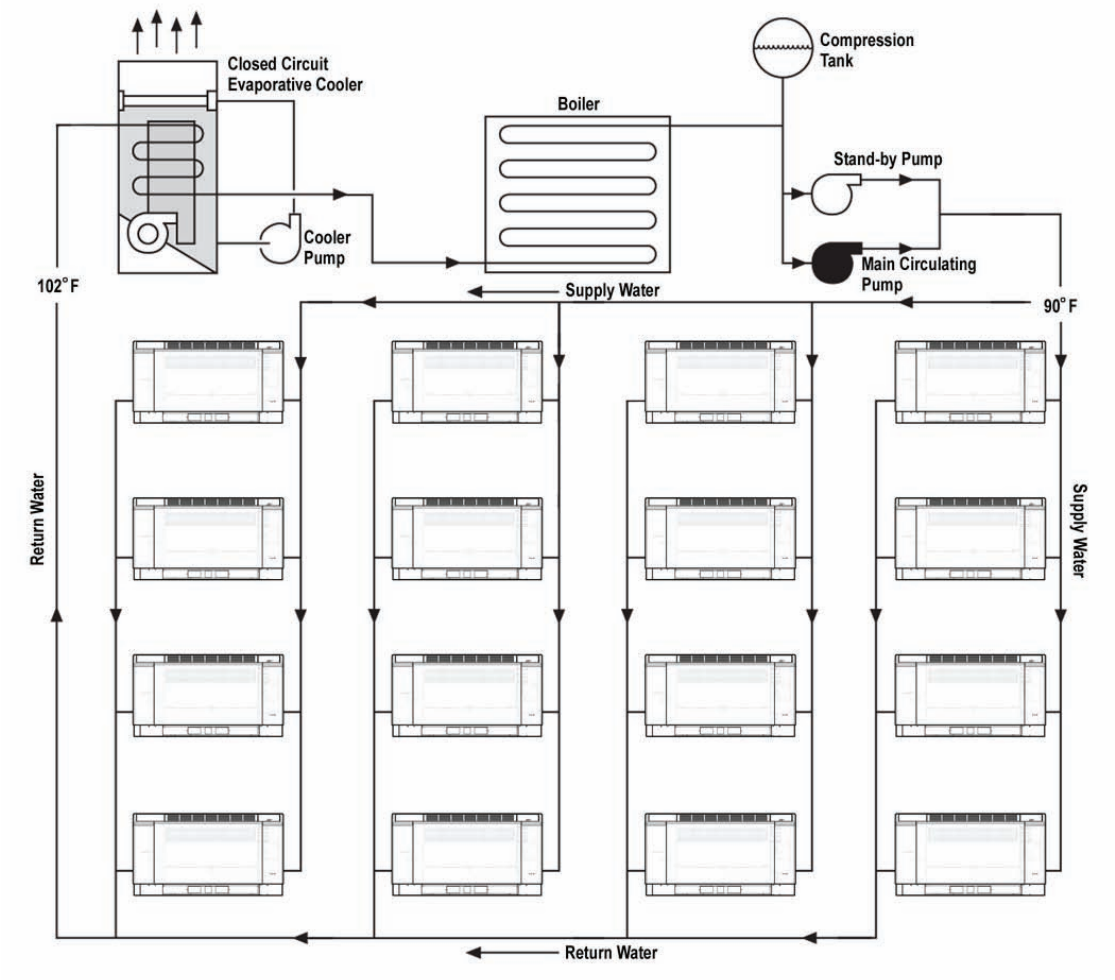
4. If sealant compound is not provided for flexible hose fittings, apply Teflon tape to the connections to help prevent leaks.

5. Supply and return shutoff valves are required at each unit. The return valve is used for balancing and should have a “memory stop” so that it can always be closed off, but can only be re-opened to the proper position for the flow required.

6. Do not connect a unit to the supply and return piping until the water system has been cleaned and flushed completely. After this is done, the initial connection should have all valves wide open in preparation for water system flushing.

7. Condensate piping can be steel, copper, or PVC. Each unit is supplied with a clear vinyl condensate hose.

Figure 4. Typical 2-Pipe Reverse Return Configuration



8. Units are internally trapped. Copper or PVC condensate lines can be used. A means of disconnection must be furnished to facilitate chassis removal.

9. No point of the drain system may be above the drain pan of any unit.

10. Automatic flow control devices must not be installed prior to system cleaning and flushing.

11. A high point of the piping system must be vented.

12. Check local code for any requirement for electric fittings.

Water Connections

All piping connections should be made using good plumbing practices and in accordance with any and all local codes that may apply.

***Note:** On left-hand piping units the water supply connection is on the top. Right hand piping units the water supply is at the bottom location.*

Unit Piping Connection

Each heat pump is supplied with extended copper tubing on the water-to-refrigerant coil and 5/8" (16mm) O.D. tubing. The connections are for both the supply and return water connections. See Figure 5 for left and right hand connections locatons.

Shutoff/Balancing Valve Piping

Each heat pump requires a shutoff valve on both the supply and return lines for easy serviceability and removal if it becomes necessary.

We suggest using our combination shutoff/balancing valves installed in the field between the contractor's piping and the heat pump unit. The valve installed on the return line acts as a balancing valve to adjust the proper water flow. An automatic flow limiting device is also available as a factory installed option.
Each shutoff/balancing valve has 1/2" FPT and 1/2" FPT threaded connections.

Attach the field installed combination shut/off balancing valve to the building water supply and return piping.

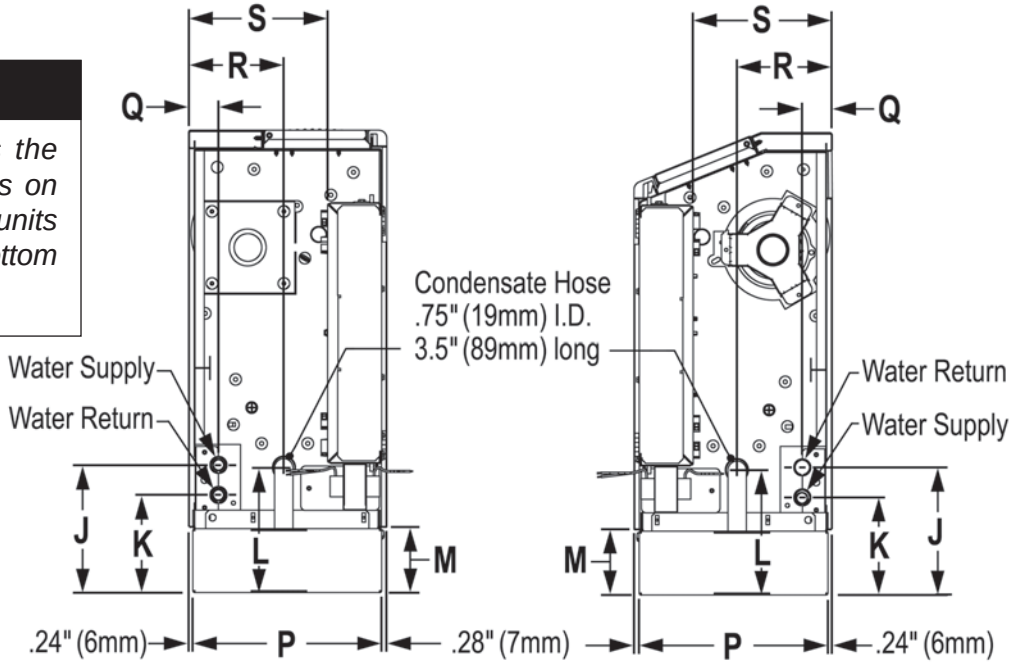
Add the female pipe adapter connection to unit supply and return coil connection by sweating them in place using silver solder.

Using the specified hoses, screw the fixed end into the shut-off/balancing valve. Remove the 1/2" adapter from the other end of the hose. Insert the adapter into the female fitting. Using two crescent wrenches, one to hold the pipe connection and the second to tighten the adapter, insert the swivel end of the hose on the adapter and tighten. This completes the hose connection to standard heat pump equipment.

IMPORTANT

On left-hand piping units the water supply connection is on the top. Right-hand piping units the water supply is at the bottom location.

Figure 5. Supply and Return Connections Locations for Left- Hand and Right Hand Units (Flat Top and Slope Top)



Left-Hand Piping View

Right-Hand Piping View

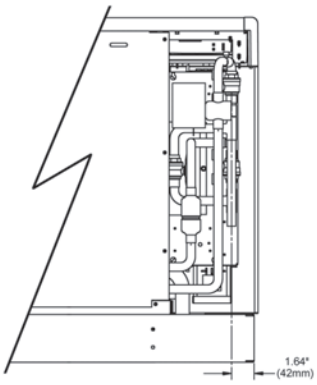
Dimensions (High Sill Units)

Unit Size	J	K	L	M	P	Q	R	S
007-018	6⅞" (175mm)	5 1/5" (132mm)	6¾" (172mm)	3½" (90mm)	10¼" (260mm)	1 3/5" (41mm)	5¼" (134mm)	7½" (192mm)

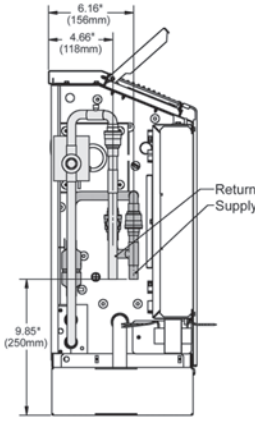
Optional Factory-Installed Motorized & Hand Valve Assemblies

Console water source heat pumps can be configured with factory-installed motorized valves. Valves should be mounted on the return water line. All valve assemblies terminate with 1/2"-NPT threaded connections and will also accommodate factory supplied hose kits.

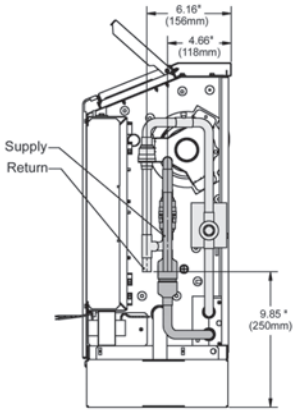
Note: *Make sure the pipes fit the confines of the piping compartment of the heat pump unit (Figure 6 & 7).*



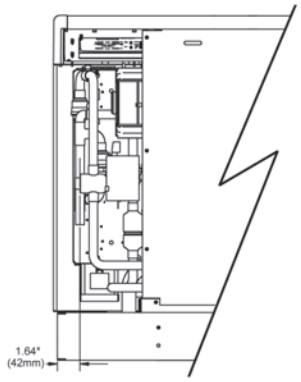
Left End Piping (Back) View



Left End Piping View



Right End Piping View

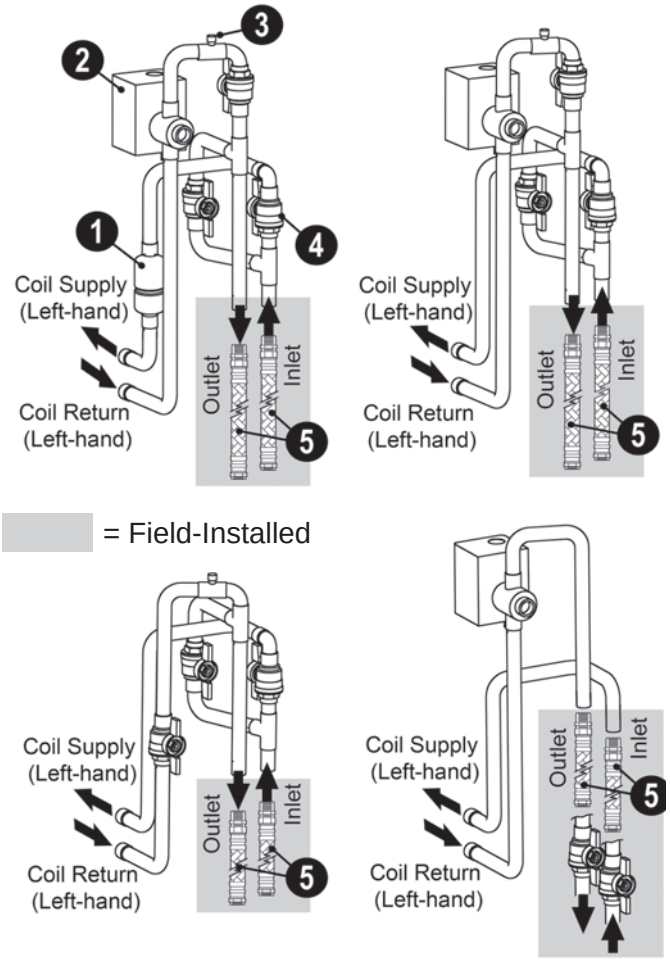


Right End Piping (Back) View

Note: *McQuay International offers a wide variety of piping packages. Consult your local sales rep for more information.*

When installing the hoses on valve assemblies, use the method as outlined in "Shutoff/Balancing Valve Piping" on page 8.

Figure 7. Typical Piping Package Configurations (Left- Hand Unit Piping Connections Shown)



1. Measureflow Device
2. 2-Way Motorized Isolation Valve
3. Air Bleed Vent
4. Supply-Bypass Hand Valve
5. Inlet, Outlet Flexible, Braided-Stainless Steel Hoses (Field-Installed Accessories)

Note: *On left hand piping units, the water supply connection is at the top location. On right-hand piping units, the water supply connection is at the bottom location.*

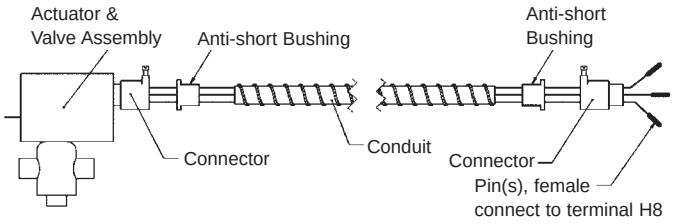
Motorized Isolation Valve

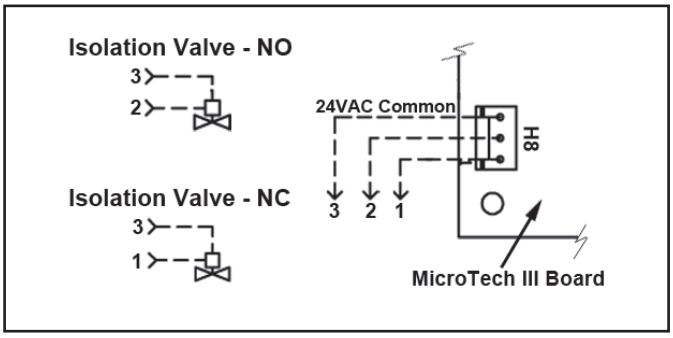
The 2-way motorized valve kit is available as a factory-installed and wired option or may be ordered as a field-installed accessory.

Wired as shown in Figure 8, the motorized valve will open on a call for compressor operation. Valves for unit sizes 007 to 018 are 1/2".

Figure 8 illustrates the wiring for a Normally Closed (NC), power open motorized valve.

Figure 8. Normally Closed, Power Open Motorized Valve Wiring





Note: *Connectors on valve must be cut off and stripped back and the wires twisted to make connections to the H8 (IV/PR) terminals on the MicroTech III controller.*

Note: *All plumbing connections are made the same, whether or not the unit has valve packages. Plumbing connections must conform with local piping and building codes. The ability to remove the unit in order to perform repairs is imperative.*

Condensate Hose Connection

Each unit is supplied with a 3/4" (19mm) I.D. clear vinyl condensate hose internally trapped within the chassis. The hose extends 3½" (89mm) out of the chassis within the piping compartment to reach the floor or the back wall. Field condensate piping must enter within the confines of the cabinet (back wall or floor) similar to the supply and return piping. Slide the vinyl hose over the condensate pipe and clamp it.

Table 2. Antifreeze Correction Factors

Ethylene Glycol

	10%	20%	30%	40%	50%
Cooling Capacity	0.9950	0.9920	0.9870	0.9830	0.9790
Heating Capacity	0.9910	0.9820	0.9770	0.9690	0.9610
Pressure Drop	1.0700	1.1300	1.1800	1.2600	1.2800

Propylene Glycol

	10%	20%	30%	40%	50%
Cooling Capacity	0.9900	0.9800	0.9700	0.9600	0.9500
Heating Capacity	0.9870	0.9750	0.9620	0.9420	0.9300
Pressure Drop	1.0700	1.1500	1.2500	1.3700	1.4200

Methanol

	10%	20%	30%	40%	50%
Cooling Capacity	0.9980	0.9720	–	–	–
Heating Capacity	0.9950	0.9700	–	–	–
Pressure Drop	1.0230	1.0570	–	–	–

Ethanol

	10%	20%	30%	40%	50%
Cooling Capacity	0.9910	0.9510	–	–	–
Heating Capacity	0.9950	0.9600	–	–	–
Pressure Drop	1.0350	0.9600	–	–	–

Cleaning & Flushing Water System

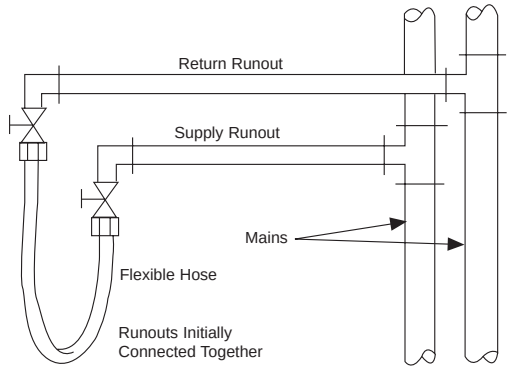
⚠ CAUTION

Prior to first operation of any unit, the water circulating system must be cleaned and flushed of all construction dirt and debris.
If the unit is provided with water shutoff valves, either electric or pressure operated, the supply and return run outs must be connected together at each unit location. This will prevent the introduction of dirt into the water circulating system. Additionally, pressure operated valves only open when the compressor is operating.

1. Prior to first operation of any unit, the water circulating system must be cleaned and flushed of all construction dirt and debris.

   If the units are equipped with water shutoff valves, either electric or pressure operated, the supply and return run outs must be connected together at each unit location. This will prevent the introduction of dirt into the unit. See Figure 9.

Figure 9. Connections for flushing system piping



2. Fill the system at the city water makeup connection with all air vents open. After filling, close all air vents.

   The contractor should start main circulator with the pressure reducing valve open. Check vents in sequence to bleed off any trapped air, ensuring circulation through all components of the system. Power to the heat rejector unit should be off, and the supplementary heat control set at 80°F (27°C). While circulating water, the contractor should check and repair any leaks in the unit and surrounding piping. Drains at the lowest point(s) in the system should be opened for initial flush and blow-down, making sure city water fill valves are set to make up water at the same rate. Check the pressure gauge at pump suction and manually adjust the makeup to hold the same positive steady pressure both before and after opening the drain valves. Flush should continue for at least two hours or longer until the drain water is clean and clear.

3. Shut off supplemental heater and circulator pump and open all drains and vents to completely drain down the system. Short circuited supply and return run outs should now be connected to the unit supply and return connections. Do not use sealers at the swivel flare connections of hoses.

4. Flush system with water for 2 hours or longer until water is clean.

5. Refill the system with clean water. Test the water using litmus paper for acidity, and treat as required to leave the water slightly alkaline (pH 7.5 to 8.5). The specified percentage of antifreeze may also be added at this time. Use commercial grade antifreeze designed for HVAC systems only. Do not use automotive grade antifreeze (See Table 2 on page 10 for Antifreeze Correction Factors).

   Once the system has been filled with clean water and antifreeze (if used), precautions should be taken to protect the system from dirty water conditions.

NOTICE

It is McQuay International's policy not to make recommendations on water treatment. It is the responsibility of the user to check that the water supply to the units is free of contaminants or corrosive agents, chemicals or minerals. The general contractor or owner should contact a local water treatment company regarding water treatment. A fouled closed loop water system will lead to premature component failure.

***Note:** Contact a local water treatment company to confirm water clarity prior to unit operation.*

Dirty water will result in system wide degradation of performance and solids may clog system-wide valves, strainers, flow regulators, etc. Additionally, the heat exchanger may become clogged which reduces compressor service life or causes premature failure.

6. Set the loop water controller heat add setpoint to 70°F (21°C) and the heat rejection setpoint to 85°F (29°C). Supply power to all motors and start the circulating pumps. After full flow has been established through all components including the heat rejector (regardless of season) and the vented air and loop temperatures have been stabilized, each of the units will be ready for check, test and start-up, air balancing, and water balancing.

⚠ CAUTION

Units must be checked for water leaks upon initial water system start-up. Water leaks may be a result of mishandling or damage during shipping. Failure by the installing contractor to check for leaks upon start-up of the water system could result in property damage.

Electrical Connections

Note: *Installation and maintenance must be performed only by qualified personnel who are familiar with local codes and regulations, and are experienced with this type of equipment.*

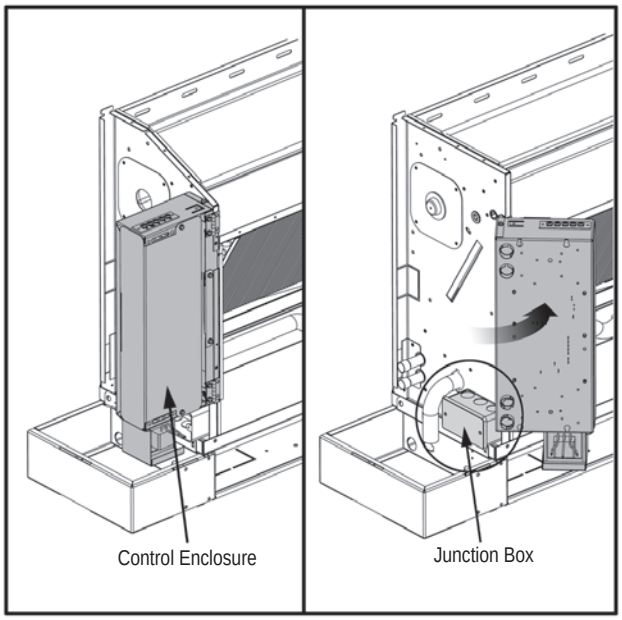
⚠ WARNING

Hazardous Voltage!
The installer must determine and follow all applicable codes and regulations. This equipment presents hazards of electricity, rotating parts, sharp edges, heat and weight. Failure to read and follow these instructions can result in property damage, severe personal injury or death.

Standard Electrical Connection

Each chassis comes with a junction box mounted on the side of the chassis and contains the field electrical connection (Figure 10).

Figure 10. Junction Box Location



Note: *If electrical wiring or conduit comes through the floor, all wires or conduit should be sealed at this point. It will prevent any condensation or water leakage that may occur due to lack of preventive maintenance. Each unit has an internal condensate trap but will require cleaning.*

Note: *Wiring coming through the wall should be sealed to stop cold air infiltration through the wall cavity which could affect unit thermostat operation. Remove the junction box cover, selecting the proper knockout and remove it. Install a strain relief and pass the wires through the strain relief into the junction box making the connection and reinstall the junction box cover.*

Note: *Check the local code concerning correct electrical connection.*

Cord & plug electrical connection (field installed)

Cord connected equipment comes with a box and appropriate voltage receptacle. However, a disconnect switch and fuses can also be provided in the box. As an option, the box comes factory mounted and is ready to be field wired to the incoming power. The box is mounted on the same side as the piping.

It is the responsibility of the installing contractor to make the proper electrical connection to the electrical box, using the same method as described in the standard electrical connection.

Mechanical (Compressor) Heating Override to Electric Heat Operation

***Note: Only with** units equipped with the electric heat feature*

In the event of a compressor failure or, electric heat is desired over mechanical (compressor) heating, a factory certified service technician may reconfigure the male and female plugs to enable electric heat. This option allows emergency electric heat when mechanical heating is not available. Electric heat can be disabled and the unit can be returned to mechanical (compresssor) heating operation when desired (Figure 11).

***Note:** In electric heat mode, unit will not run compressor on a call for heating. The electric heater will be utilized instead.*

⚠ WARNING

Before disconnecting or connecting plugs, be sure power to unit is off and power disconnect switch is in the off position.

Switching Mechanical (Compressor) Heating to Electric Heat Operation

1. Disconnect wires 70 and 71 plug located on outside of control box from socket that connects to the Entering Water Temperature (EWT) Sensor (Figure 11).
2. Reconnect wires 70 and 71 plug into the Electric Heat (EH) socket located on the back of the hinged control box (Figure 11).
3. Coil the disconnected Entering Water Temperature Sensor wire and store in safe location for later use.

Figure 11. Switching to Electric Heat Detail

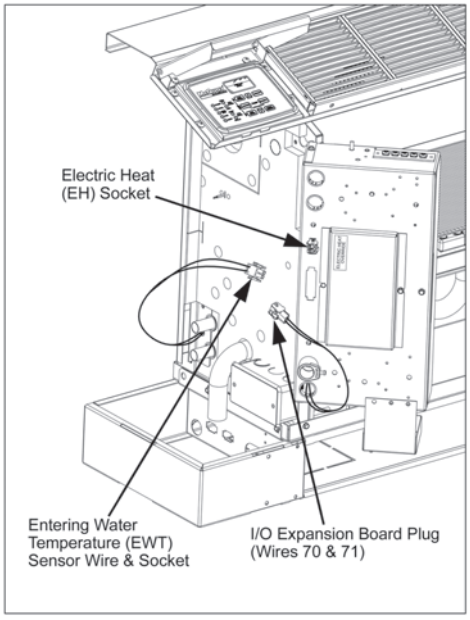


Table 3. Electric Heater Current and Power

Nominal Voltage	Sizes 007, 009, 012 2.5kW		Sizes 015, 018 3.5kW	
	Power (kW)	Current (Avg)	Power (kW)	Current (Avg)
208	2.01	9.67	2.71	13.02
230	2.46	10.70	3.31	14.40
240	2.68	11.16	3.61	15.03
265	3.27	12.33	4.40	16.59
277	3.57	12.88	4.80	17.35

Electrical Data

General

1. Be sure the available power is the same voltage and phase as that shown on the unit serial plate. Line and voltage wiring must be done in accordance with local codes or the National Electrical Code, whichever is applicable.
2. Apply correct line voltage to the unit. A disconnect switch near the unit is required by code. Power to the unit must be sized correctly and have dual element (Class RK5) fuses or HACR circuit breaker for branch circuit overcurrent protection. See the nameplate for correct ratings.
3. All 208-230V single phase units are factory wired for 208 volt operation unless specified for 230 volts.

Operating Voltages

115/60/1 . . . . . 104 volts min.; 127 volts max.
208-230/60/1 . . . . 197 volts min.; 253 volts max.
265/60/1 . . . . . 238 volts min.; 292 volts max.
230/50/1 . . . . . 197 volts min.; 253 volts max.

***Note:** Voltages listed are to show voltage range. However, units operating with over voltage and under voltage for extended periods of time will experience premature component failure.*

Operating Limits

Environment

This equipment is designed for indoor installation **only.** Sheltered locations such as attics, garages, etc., generally will not provide sufficient protection against extremes in temperature and/or humidity, and equipment performance, reliability, and service life may be adversely affected.

Table 4. Air Limits

	Standard Range Units		Geothermal Range Units	
	Cooling	Heating	Cooling	Heating
Min. Ambient Air	50˚F/10˚C	50˚F/10˚C	40˚F/5˚C	40˚F/5˚C
Normal Ambient Air	80˚F/27˚C	70˚F/21˚C	80˚F/27˚C	70˚F/21˚C
Max. Ambient Air	100˚F/38˚C	85˚F/29˚C	100˚F/38˚C	85˚F/29˚C
Min. Entering. Air ①②	50˚F/10˚C	50˚F/10˚C	50˚F/10˚C	40˚F/5˚C
Normal Entering Air, db/wb	80˚F/67˚F 27/19˚C	70˚F 21˚C	80˚F/67˚F 27/19˚C	70˚F 21˚C
Max. Entering Air db/wb ①②	100/83˚F 38/28˚C	80˚F 27˚C	100/83˚F 38/28˚C	80˚C 27˚C

Table 5. Water Limits

	Standard Range Units		Geothermal Range Units	
	Cooling	Heating	Cooling	Heating
Min. Entering. Water ①②	55°F/13°C	55°F/13°C	30°F/-1°C	20°F/-6°C
Normal Entering. Water	85°F/29˚C	70˚F/21°C	77°F/25˚C	40˚F/5°C
Max. Entering. Water ①②	110°F/43˚C	90°F/32°C	110°F/43˚C	90°F/32°C

① At ARI flow rate.

② Maximum and minimum values may not be combined. If one value is at maximum or minimum, the other two conditions may not exceed the normal condition for standard units. Extended range units may combine any two maximum or minimum conditions, but not more than two, with all other conditions being normal conditions.

Additional Information

Units are designed to start and operate with entering air at 40°F (4°C), with entering water at 70°F (21°C), with both air and water at the flow rates used in the ARI-Standard 320-86 rating test, for initial start-up in winter.

Note: *This is not a normal or continuous condition. It is assumed that such a start-up is for the purpose of bringing the building space to occupancy temperature.*

MicroTech® III Unit Controller

The MicroTech III Unit Controller includes built-in features such as random start, compressor time delay, shutdown, condensate overflow protection, defrost cycle, brownout, and LED/fault outputs. Table 6 shows the LED and fault output sequences.

The unit has been designed for operation with either a unit mounted thermostat or a microelectronic wall thermostat, selected by the manufacturer. Do not operate the unit with any other type of wall thermostat.

Each unit has a printed circuit board control system. The low voltage output from the low voltage terminal strip is AC voltage to the wall thermostat. R is A/C voltage output to the wall stat.

The 24 volt low voltage terminal strip is set up so R-G energizes the fan, R-Y1 energizes the compressor for cooling operation, R-W1 energizes the compressor and reversing valve for heating operation. The reversing valve is energized in the heating mode. The circuit board has a fan interlock circuit to energize the fan whenever the compressor is on if the thermostat logic fails to do so.

The output to the wall stat is AC current. Terminal (R) on the wall stat can be connected to terminal (R) on the PC board for AC voltage.

R = AC current
R to G = fan only
R to Y1 = cooling
R to W1 = heat

The MicroTech III unit controller has a lockout circuit to stop compressor operation if any one of its safety devices is triggered (high pressure switch and low temperature sensor). If the low temperature sensor is triggered, the unit will go into the cooling mode for 60 seconds to defrost any slush in the water-to-refrigerant heat exchanger. After 60 seconds the compressor is locked out. If the condensate sensor detects a filled drain pan, the compressor operation will be suspended only in the cooling mode. The unit is reset by opening and closing the disconnect switch on the main power supply to the unit in the event the unit compressor operation has been suspended due to low temperature sensor or high pressure switch. The unit does not have to be reset on a condensate overflow detection.

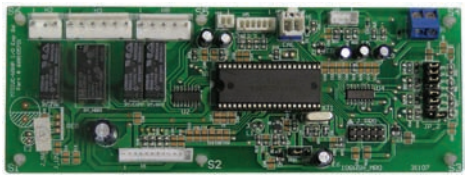
The MicroTech III unit controller fault output sends a signal to an LED on a wall thermostat. Table 6 shows for which functions the fault output is “on” (sending a signal to the LED).

Table 6. MicroTech III Unit Controller LED & Fault Outputs

Mode / Fault	Status LED's			Thermostat Alarm Light Output-Terminal “A”
	Yellow	Green	Red	
Occupied, Bypass, Standby, or Tenant Override	Off	On	Off	Energized
Unoccupied	On	On	Off	Energized
Condensate Overflow	On	Off	Off	De-engergized
High Pressure 1 Fault	Off	Off	Flash	De-energized
Low Pressure 1 Fault	Off	Off	On	De-energized
Low Temperature 1 Fault	Flash	Off	Off	De-energized
Brownout	Off	Flash	Off	De-energized
Emergency Shutdown	Off	Flash	Off	De-energized
Room/Return Air or Low Temp Sensor 1 Failure	Flash	Flash	On	De-engergized
Service Test Mode Enabled [1]	On	On	Off	De-energized
Serial EEPROM Corrupted	On	On	On	De-energized
Network “Offline” Received	Off	Off	Off	De-enegized

[1] Compressor relay/compressor terminal is labeled COMP, switched line of the same electric input as any of the L1 terminals.

I/O Expansion Module



This manual covers the installation of a McQuay Console Unit - Model MHC, MHW Water Source Heat Pump. For installation and operation information on MicroTech III unit controller and other ancillary components, see:

- IM 927 - MicroTech III LONWORKS Communication Module
- IM 928 - MicroTech III BACnet Communication Module
- OM 931 - MicroTech III Unit Controller for Water Source Heat Pumps Operation and Maintenance Manual

The I/O Expansion Module is a factory installed option. It is an extension of the MicroTech III unit controller and provides extra functionality.
The I/O Expansion Module has 2 main purposes:

- The I/O Expansion Module has outputs to control electric heat on a standard Water Source Heat Pump.
- The I/O Expansion Module has an independent LED annunciator to identify operational fault conditions for the electric heater.

Table 7 . I/O Expansion Module LED & Fault Outputs

Mode / Fault	Status LED's			Thermostat Alarm Light Output Terminal "A"
	Yellow	Green	Red	
Invalid Configuration Jumper Setting	Flash	Flash	Off	De-energized
Base Board Communication Fail	Off	Flash	Flash	N/A
High Pressure #2 Fault	Off	Off	Flash	De-energized
Low Pressure #2 Fault	Off	Off	On	De-energized
Low Suction Temp #2 Fault	Flash	Off	Off	De-energized
Sensor Failures Low Suction Low Suction Temp #2, [1] EWT (w/ Boilerless EH only)	Flash	Flash	On	De-energized
[2] Service Test Mode Enabled	Flash	Flash	Flash	De-energized
Unoccupied Mode	On	On	Off	Energized
Occupied, Bypass, Standby, or Tenant Override Modes	Off	On	Off	Energized
Normal Operation	Off	On	Off	De-energized

***Note:** Mode / Faults are listed in order of priority.*

[1] Boilerless electric heat only

[2] Alarm/fault LED indications take precedence over service test mode LED indication. The controller shall use service test mode if the service test mode jumper is installed, even if the LED's indicate an alarm/fault.

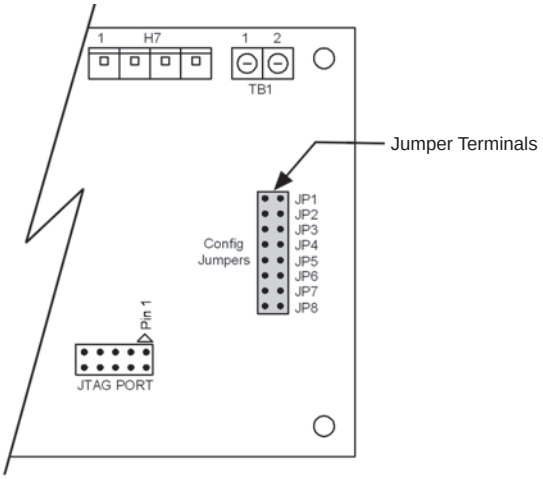
= Not used with Console Water Source Heat Pump unit.

Table 8. I/O Expansion Module Configuration Jumper Settings

Jumper	Description	Options
JP1	Number of Compressors	Open for single compressor
		Shorted for dual compressor
JP2	Hot Gas/ Water Reheat	Open to disable reheat
		Shorted to enable reheat
JP3 & JP4	Supplemental Heat Type	JP3 and JP4 open for no supplemental heat
		JP3 open, JP4 shorted for boilerless electric heat
		JP3 and JP4 shorted is an invalid setting
JP5 & JP6	Fan Speed Selection	JP5 and JP6 open for single-speed fan
		JP5 open, JP6 shorted for three-speed fan
		JP5 shorted and JP6 open for two-speed fan
		JP 5 and JP6 shorted is an invalid setting
JP7	Compressor Speed Type	Open for single-speed compressor
		Shorted for two-speed compressor
JP8	Future Spare	

= Not used with Console Water Source Heat Pump unit.

Figure 12. I/O Expansion Module Configuration Jumper Terminals



Adding an I/O Expansion Module (with an interconnect cable) to the unit controller allows the operation of boilerless electric heat with the Console Water Source Heat Pump.

Features

Standard Heat Pumps / Single Circuit Units

- Monitors entering water temperature for boilerless electric heat control

MicroTech III Unit Controller with LonWorks® Communication Module

This manual covers the installation of a McQuay Console Water Source Heat Pump. For installation and operation information on LonWorks Communication Module and other ancillary control components, see:

- IM 927 - MicroTech III Unit Controller for Water Source Heat Pumps (LonWorks).
- IM 933 - LonMaker Integration Plug-in Tool: For use with the MicroTech III Unit Controller.
- IM 955 - MicroTech III Wall Sensor For use with Microtech III Unit Controller
- OM 931 - MicroTech III Unit Controller for Water Source Heat Pumps Operation and Maintenance Manual

Each McQuay water source heat pump can be equipped with a LonWorks communication module that is LonMark 3.4 certified. The controller is microprocessor-based and is designed to communicate over a LonWorks communications network. It can be factory or field-installed.

The unit controller is programmed and tested with all the logic required to monitor and control the unit. An optional wall sensor may be used with the communication module to provide limited local control of the Water Source Heat Pump. The unit controller monitors water and air temperatures and passes information to the communication module. The module communicates with the BAS, to provide network control of the Water Source Heat Pump.

Figure 13. LonWorks Communication Module

LONMARK 3.4

MicroTech III Unit Controller with LonWorks Communication Module orchestrates the following unit operations:

- Enable heating and cooling to maintain setpoint based on a room sensor
- Enable fan and compressor operation
- Monitors all equipment protection controls
- Monitors room and discharge air temperatures
- Monitors leaving water temperature
- Relays status of all vital unit functions

An amber, on-board status LED indicates the status of the MicroTech III LonWorks module.

The MicroTech III unit controller includes:

- A unit-mounted return air sensor
- A unit-mounted discharge air sensor
- A leaving water temperature sensor

The communication module provides access to setpoints for operational control

Available wall sensors include:

- Room sensor
- Room sensor with LED status and tenant override button
- Temperature sensor with LED status, timed-override button, and ±3°F setpoint adjustment
- Room sensor with LED status, timed-override button, 55° to 90°F setpoint adjustment

MicroTech III Controller with BACnet MS/TP Communication Module

For installation and operation information on MicroTech III unit controller and other ancillary components, see:

- IM 928 - MicroTech III BACnet Communication Module
- OM 931 - MicroTech III Unit Controller for Water Source Heat Pumps Operation and Maintenance Manual
- IM 955 - MicroTech III Wall Sensor For use with Microtech III Unit Controller

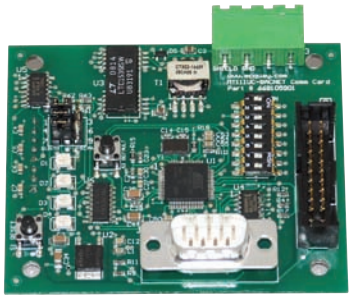
McQuay water source heat pumps are available with McQuay BACnet communication module The module is programmed and tested with all the logic required to control the unit, and is designed to communicate over a BACnet MS/TP communications network to a building automation system (BAS). It can be factory or field-installed.

The unit controller is programmed and tested with all the logic required to monitor and control the unit. An optional wall sensor may be used with the communication module to provide limited local control of the Water Source Heat Pump. The unit controller monitors water and air temperatures and passes information to the communication module. The module communicates with the BAS, to provide network control of the Water Source Heat Pump.

The module makes operational data and commands available on a communications network using BACnet objects and properties:

- The network cable is a shielded twisted-pair cable
- Network communications run at 76.8 Kbps.
- DIP switches on the controller enable the MS/TP MAC address to be set in the range 0-127.
- A status LED on the communication module indicates communication activity on the MS/TP communication network.

Figure 14. MicroTech III BACnet Water Source Heat Pump Snap-in Communication Module



MicroTech III Unit Controller with BACnet Communication Module orchestrates the following unit operations:

- Enable heating and cooling to maintain setpoint based on a room sensor
- Enable fan and compressor operation
- Monitors all equipment protection controls
- Monitors room and discharge air temperatures
- Monitors leaving water temperature
- Relays status of all vital unit functions

An amber, on-board status LED indicates the status of the MicroTech III BACnet module.

The MicroTech III unit controller includes:

- A unit-mounted return air sensor
- A unit-mounted discharge air sensor
- A leaving water temperature sensor

The communication module provides access to setpoints for operational control

Available wall sensors include:

- Room sensor
- Room sensor with LED status and tenant override button
- Room temperature sensor with LED status, timed-override button, and ±3°F setpoint adjustment
- Room temperature sensor with LED status, timed-override button, 55° to 90°F setpoint adjustment

MicroTech® III Unit Controller Terminals Locations and Descriptions

H1 - 1	24	24 VAC Power Input
H1 - 2	C	24 VAC Common
H2 - 1	SL1	Fan Output - Switched L1
H2 - 2		Blank Terminal
H2 - 3	N	Fan Neutral
H3 - 1	HP1-1	High Pressure Switch 1 Input Terminal 1
H3 -2	HP1-2	High Pressure Switch 1 Input Terminal 2
H4 - 1		Discharge Air Temp Common
H4 - 2		Discharge Air Temp Signal
H4 - 3		Leaving Water Temp Common
H4 - 4		Leaving Water Temp Signal
H5 - 1	1	I/O Exp Module Common (Gnd)
H5 - 2		I/O Exp Module Common (Gnd)
H5 - 3		I/O Exp Module +5 VDC
H5 - 4		I/O Exp Module SPI CE1
H5 - 5		I/O Exp Module SPI CLK
H5 - 6		I/O Exp Module SPI OUT
H5 - 7		I/O Exp Module SPI IN
H5 - 8		I/O Exp Module +12 VDC
H5 - 9		I/O Exp Module 24 VAC
H5 - 10		I/O Exp Module 24 VAC
H5 - 11		Spare
H5 - 12		Spare
H6 - 1	1	Condensate Overflow Signal Input
H6 - 2		Low Temp 1 Sensor Common
H6 - 3		Low Temp 1 Sensor Signal
H6 - 4		Low Pressure Switch 1 Source Voltage
H6 - 5		Low Pressure Switch 1 Signal
H6 - 6		Reversing Valve 1 Common
H6 - 7		Reversing Valve 1 Output
H7 - 1	1	Dummy Terminal
H7 - 2		Dummy Terminal
H7 - 3		Red LED Output
H7 - 4		Green LED Output
H7 - 5		Yellow LED Output
H7 - 6		Red-Green-Yellow LED Common
H8 - 1	1	Isolation Valve/Pump Request Relay N/O
H8 - 2		Isolation Valve/Pump Request Relay N/C
H8 - 3		24 VAC Common
H9 - 1	1	Return Air Temperature Signal
H9 - 2		Return Air Temperature Common
TB1 - 1	1	Room Sensor LED Output
TB1 - 2	2	Fan Mode / Heat-Cool-Auto Input
TB1 - 3	3	Setpoint Adjust Input
TB1 - 4	4	Room Temperature Sensor / Tenant Override
TB1 - 5	5	DC Signal Common
Test-1	R	24 VAC
Test-2	W2	Heat Stage 2 Input
Test-3	W1	Heat Stage 1 Input
Test-4	Y2	Cool Stage 2 Input
Test-5	Y1	Cool Stage 1 Input
Test-6	G	Fan
TB2 - 1	R	24 VAC
TB2 - 2	A	Alarm Output
TB2 - 3	W2	Heat Stage 2 Input
TB2 - 4	W1	Heat Stage 1 Input
TB2 - 5	Y2	Cool Stage 2 Input
TB2 - 6	Y1	Cool Stage 1 Input
TB2 - 7	G	Fan Input
TB2 - 8	O	Tenant Override Input
TB2 - 9	C	24 VAC Common
TB3 - 1	E	Mark IV Emergency Shutdown Input
TB3 - 2	U	Mark IV Unoccupied/Occupied Input
L1 - 1	L1 - 1	Line Voltage Terminal 1
L1 - 2	L1 - 2	Line Voltage Terminal 2
L1 - 3	L1 - 3	Line Voltage Terminal 3
N1	N1	Neutral Terminal 1
N2	N2	Neutral Terminal 2
N3	N3	Neutral Terminal 3

Table 9. – Configuration Jumper Settings

Jumper	Description	Options
JP1	Mode	Open for normal operation mode
		Shorted for service/test operation mode
JP2	Fan operation only applies to network controls	Open for continuous fan operation
		Shorted for cycling fan operation
JP3	Freeze protection	Open for water freeze protection
		Shorted for antifreeze protection
JP4	Future spare	Future spare
JP5	Set point adjustment range only applies to network controls with a room temperature sensor	Open for adjustment range of -3.0° to +3.0° F
		Shorted for 50° to 90° F adjustment range
JP6	Room control type	Open for thermostatic room control
		Shorted for room temperature sensor control, MicroTech III only
JP7	Future spare	Future spare
JP8	Future spare	Future spare

Note: *A random start delay time between 180 and 240 seconds is generated at power up.*

Location of Configuration Jumpers on the MicroTech III Unit Controller

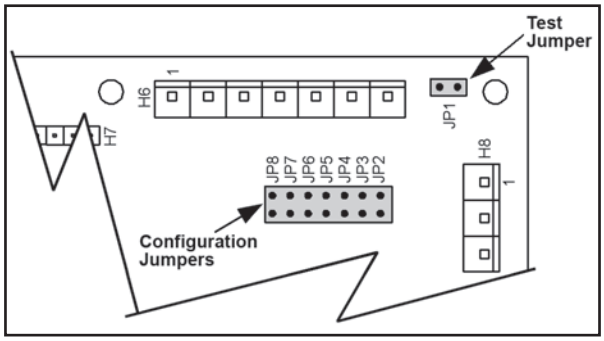


Figure 15. MicroTech III Unit Controller Terminal Locations

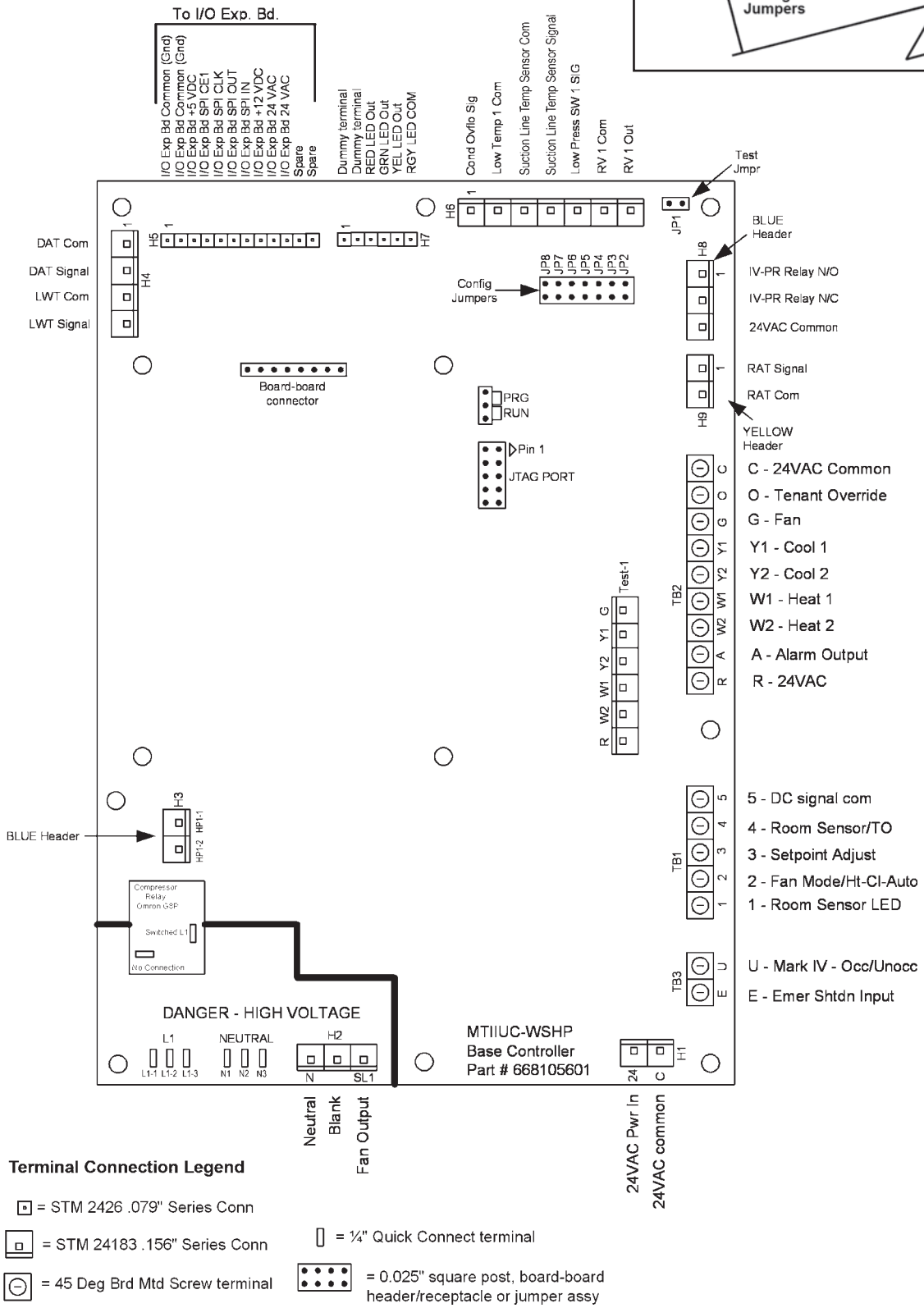
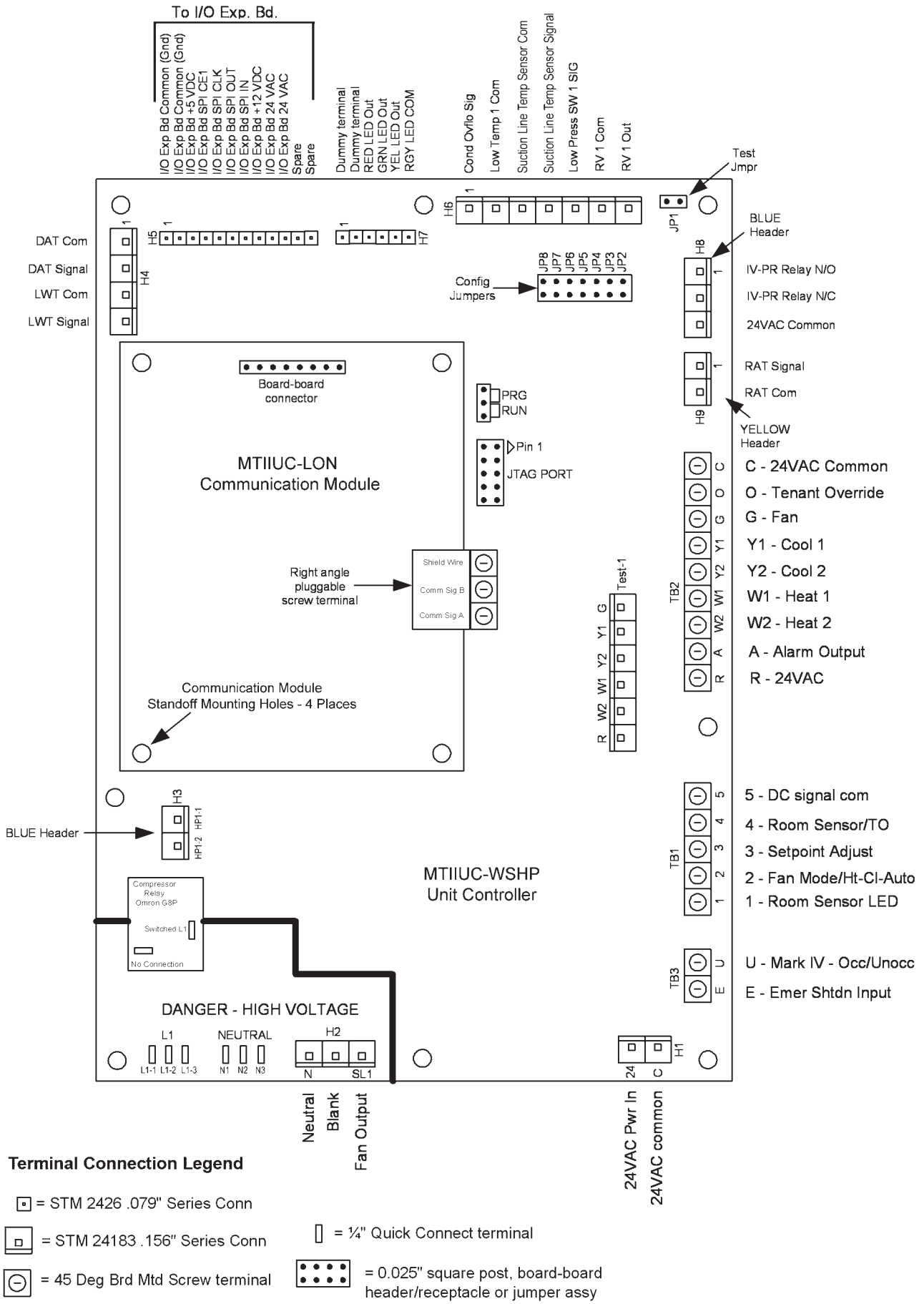


Figure 16. LONWORKS Communication Module Placement on MicroTech III Unit Controller



Typical Wiring Diagrams

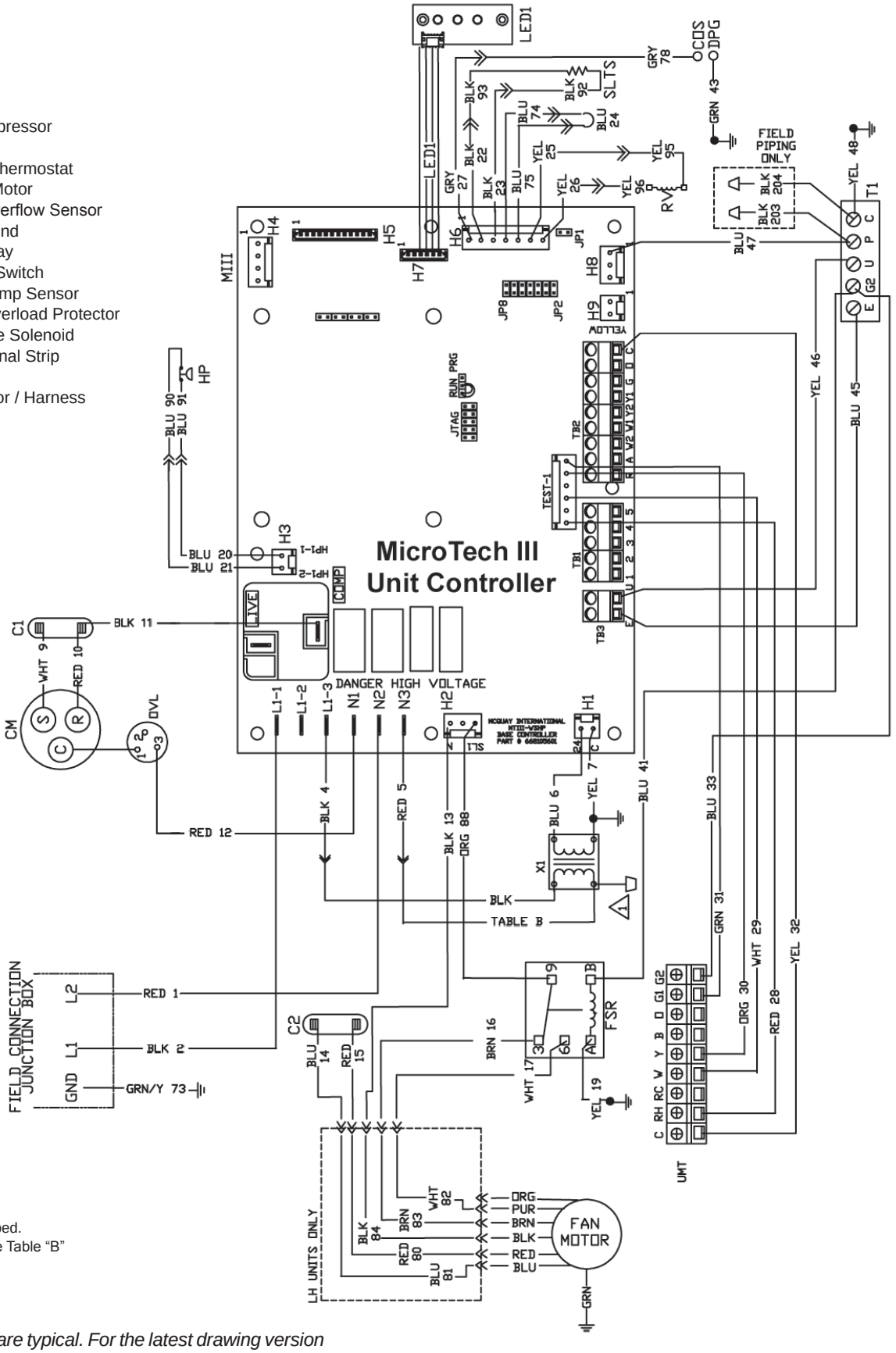
MicroTech III Unit Controller for Sizes 007-015 – 208/230/60Hz/1-Phase

Drawing No. 669539003A

Legend

Item	Description
C1	Capacitor-Compressor
C2	Capacitor-Fan
UMT	Unit-Mounted Thermostat
CM	Compressor - Motor
COS	Condensate Overflow Sensor
DPG	Drain Pan Ground
FSR	Fan Speed Relay
HP	High Pressure Switch
SLTS	Suction Line Temp Sensor
OVL	Compressor Overload Protector
RV	Reversing Valve Solenoid
T1	EG2UPC Terminal Strip
X1	Transformer
LED1	LED Annunciator / Harness

Table B	
208V	RED
230V	ORG



Notes:

1. Transformer:
   Unused wire to be capped.
2. Unit wired for 208V, see Table "B"

Note: *Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.*

Typical Wiring Diagrams

MicroTech III Unit Controller With Electric Heat for Size 018

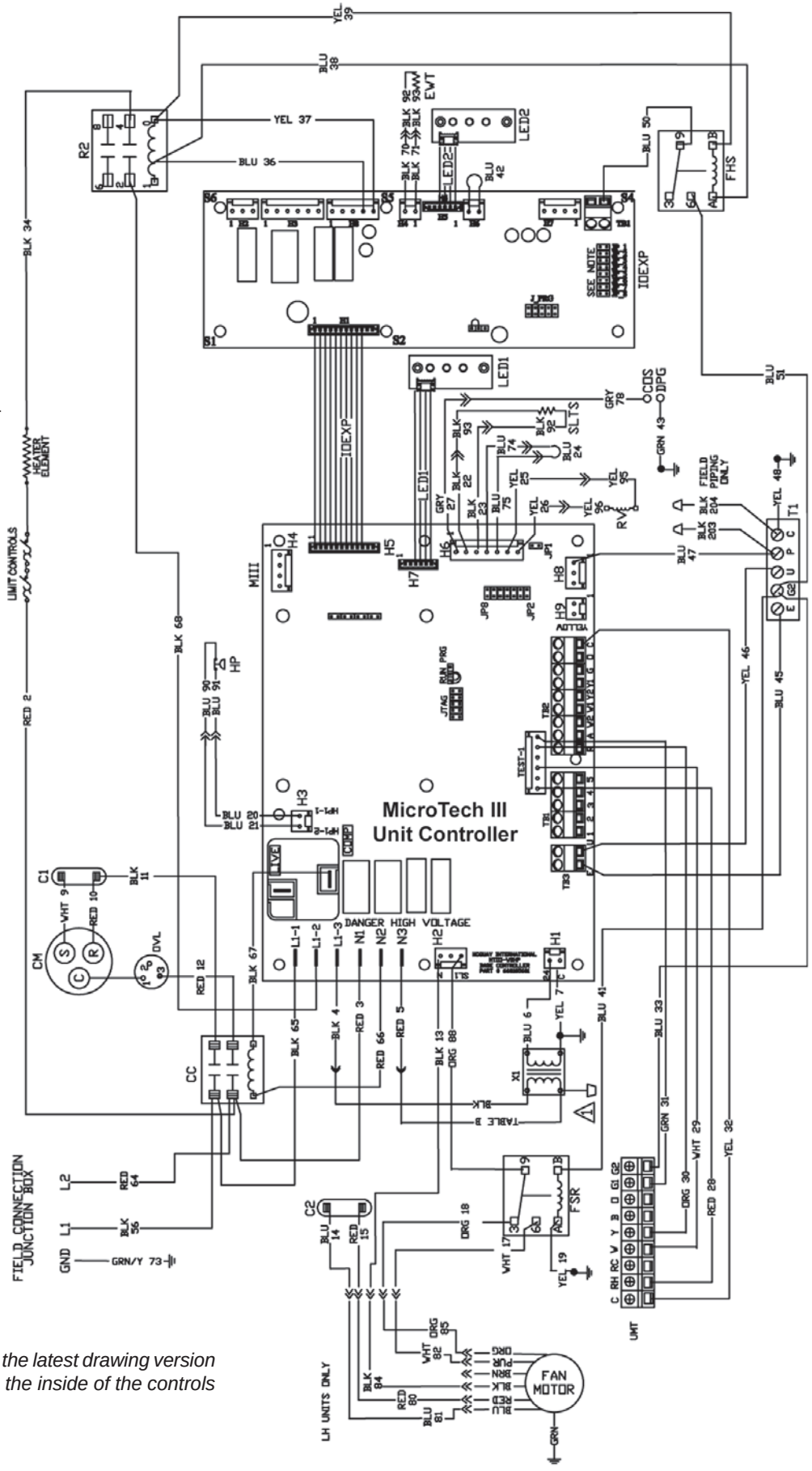
208/230/60Hz/1-Phase

Drawing No. 669539006A

Legend

Item	Description
C1	Capacitor-Compressor
C2	Capacitor-Fan
CC	Compressor Contactor
CM	Compressor - Motor
COS	Condensate Overflow Sensor
DPG	Drain Pan Ground
FSR	Fan Speed Relay
HP	High Pressure Switch
R2	Relay - Electric Heat
IOEXP	I/O Expansion Board / Harness
LED2	LED Annunciator / Harness
SLTS	Suction Line Temp Sensor
OVL	Compressor Overload Protector
RV	Reversing Valve Solenoid
T1	EG2UCP Terminal Strip
X1	Transformer
LED1	LED Annunciator / Harness
FHS	Fan High Speed Relay
UMT	Unit-Mounted Thermostat
EWT	Entering Water Temp Sensor

Table B	
208V	RED
230V	ORG



Notes:

1. Transformer: Unused wire to be capped.
2. Unit wired for 208V, see Table “B”
3. I/O Expansion board jumper JP4 shorted.

Note: *Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.*

Typical Wiring Diagrams

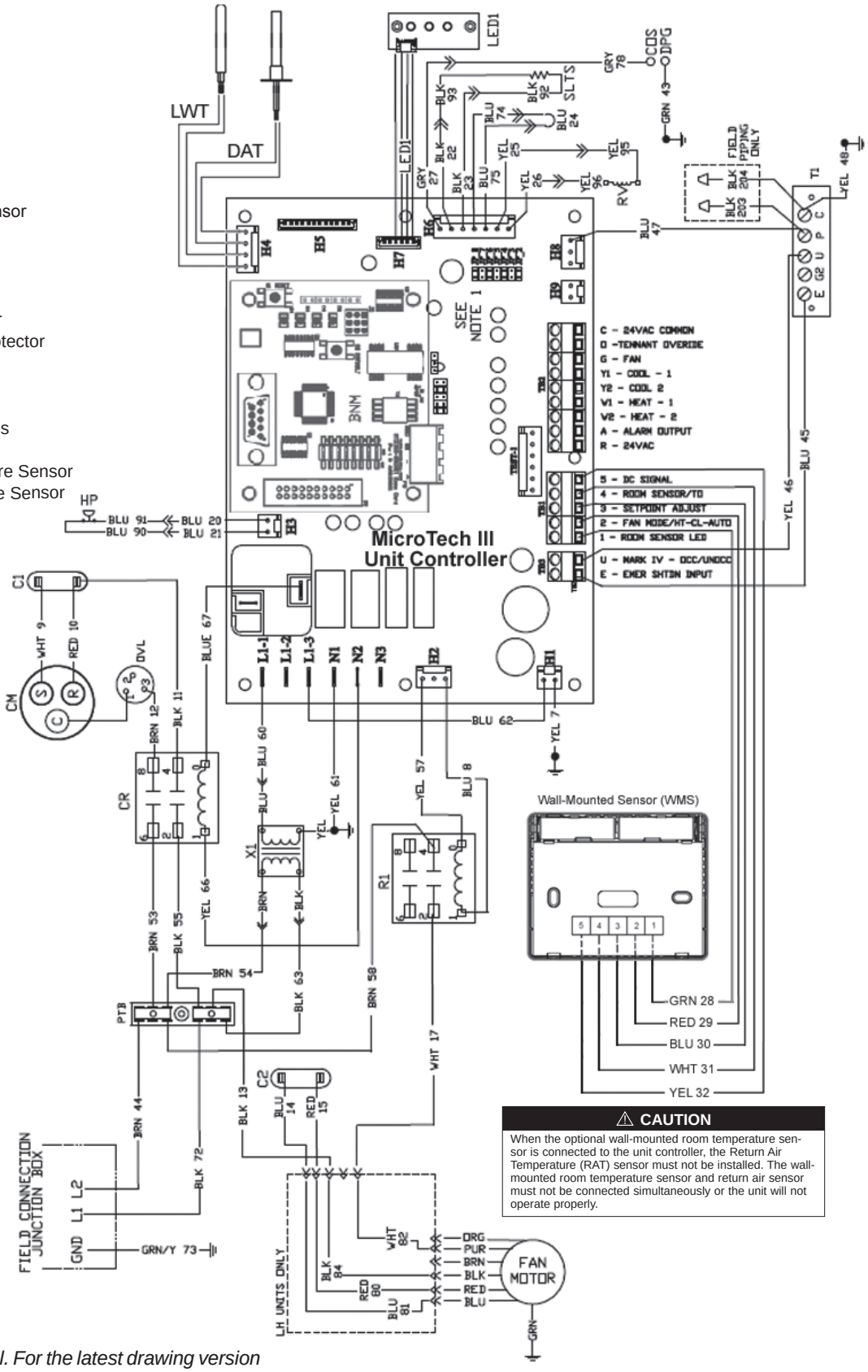
MicroTech III Unit Controller with Communication Module and Wall-Mounted Room Temperature Sensor

265/277/60Hz/1-Phase

Drawing No. 669542001

Legend

Item	Description
C1	Capacitor-Compressor
C2	Capacitor-Fan
R1	Relay - Fan Motor
CM	Compressor - Motor
COS	Condensate Overflow Sensor
DPG	Drain Pan Ground
FSR	Fan Speed Relay
PTB	Power Terminal Block
HP	High Pressure Switch
SLTS	Suction Line Temp Sensor
OVL	Compressor Overload Protector
RV	Reversing Valve Solenoid
T1	EG2UCP Terminal Strip
X1	Transformer
LED1	LED Annunciator / Harness
CR	Compressor Relay
LWT	Leaving Water Temperature Sensor
DAT	Discharge Air Temperature Sensor



Note: *Wiring diagrams are typical. For the latest drawing version refer to the wiring diagram located on the inside of the controls access panel of the unit.*

Start-up

⚠ CAUTION

Units must be checked for water leaks upon initial water system start-up. Water leaks may be a result of mishandling or damage during shipping. Failure by the installing contractor to check for leaks upon start-up of the water system could result in property damage.

Cooling or Heating – Manual Operation

The Microtech III unit controller has built-in features such as random start, compressor time delay, night setback, load shed, shutdown, condensate overflow protection, defrost cycle, brownout, and LED/fault outputs. Table 10 shows the LED and fault output sequences. The 24 volt low voltage terminal strip is set so R-G energizes the fan. R-W1 energizes the fan and compressor and reversing valve for heating operation.

The reversing valve is set up to be energized in the heating mode. The circuit board has a fan interlock circuit to energize the fan whenever the compressor is on.

The Microtech III unit controller has a lockout circuit to stop compressor operation if any one of its safeties opens (high pressure or suction line sensor). If the suction line low temperature sensor opens, the unit will go into the cooling mode for 60 seconds to defrost any slush in the water-to-refrigerant heat exchanger.

After 60 seconds, the compressor is locked out. If the condensate sensor detects a filled drain pan, the compressor operation will be suspended only in the cooling mode. The unit is reset by opening and closing the disconnect switch on the main power supply to the unit in the event the unit compressor operation has been suspended due to low suction line sensor reaching its set point, or a high pressure switch.

The Microtech III unit controller has a fault output signal to an LED on a wall thermostat. Table 10 shows in which function the fault output is “on” (sending a signal to the LED).

Table 10. LED Fault Indicators

LEDs Indication	Fault			Output
	Yellow	Green	Red	
Normal Mode	Off	On	Off	Off
High Pressure Fault	Off	Off	Flash	On
Low Temperature Fault*	Flash	Off	Off	On
Condensate Overflow	On	Dim	Off	On
Brownout	Off	Flash	Off	On
Load Shed	Off	Off	On	Off
Unoccupied Mode	On	On	Off	Off
Unit Shutdown	Off	Flash	Off	On

IMPORTANT

Each water source heat pump unit has a compressor and blower motor. Each component part has and internal temperature and amperage sensitive overload. If the overload opens it will suspend unit operation. Check component parts by measuring the winding resistance and looking for an open circuit.

Additional Accessories – General

Thermostats and Wall Sensors

Easy-to-operate comfort command centers provide a complete range of deluxe features.

Wall-Mounted Programmable Electronic Thermostat (P/N 668811301)

1 Heat/1 Cool, Auto Changeover, Hardwired

- 7-Day, 5-2-Day 5-1-1 Day Programmable
- Configurable
- Single-Stage Heat/Cool Systems
- Single-Stage Heat Pump Systems
- Large Display With Backlight
- Selectable Fahrenheit or Celsius
- SimpleSet™ Field Programming
- Status Indicator Light
- Relay Outputs (minimum voltage drop in thermostat)
- Remote Sensor Compatible
- Ideally Suited for:
  – Residential (New Construction/Replacement)
  – Light Commercial

Specifications–668810301

Electrical rating: • 24 VAC (18-30 VAC)
• 1 amp maximum per terminal
• 3 amp maximum total load

Temperature control range: 45°F to 90°F (7°C to 32°C) Accuracy: ± 1°F (± 0.5°C)

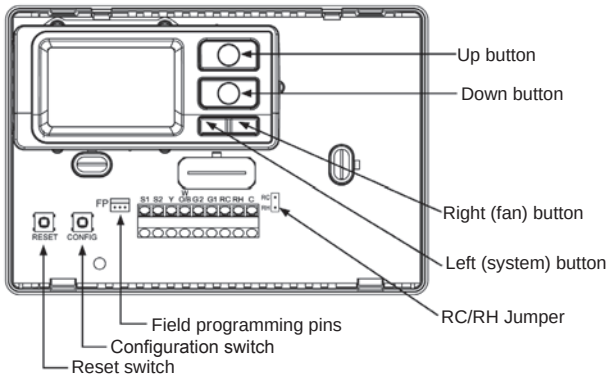
System configurations: 1-stage heat, 1-stage cool, heat pump

Timing: Anti-short Cycle: 4 minutes
Backlight Operation

Terminations: S1, S2, Y, W/O/B, G2, G1, RC, RH, C

For detailed installation, operation and application refer to Operation & Application Guide LIA303

Figure 17. Thermostat Parts Diagram - Part No. 668811301



Specifications–668811201

Electrical rating: • 24 VAC (18-30 VAC)
• 1 amp maximum per terminal
• 3 amp maximum total load

Temperature control range: 45°F to 90°F (7°C to 32°C) Accuracy: ± 1°F (± 0.5°C)

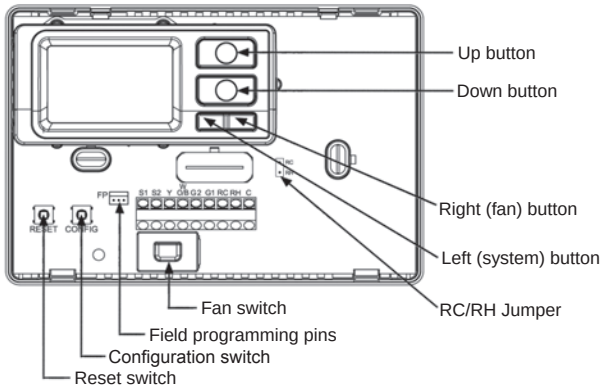
System configurations: 1-stage heat, 1-stage cool, heat pump

Timing: Anti-short Cycle: 4 minutes
Backlight Operation

Terminations: S1, S2, Y, W/O/B, G2, G1, RC, RH, C

For detailed installation, operation and application refer to Operation & Application Guide LIAF014

Figure 18. Thermostat Parts Diagram - Part No. 668811201



Non-Programmable Electronic Thermostat (P/N 668811201)

1 Heat/1 Cool, Auto Changeover, Fan Speed Control, Hardwired

- Configurable
- Single-Stage Heat/Cool Systems
- Single-Stage Heat Pump Systems
- Fan Speed Control
- Large Display With Backlight
- Selectable Fahrenheit or Celsius
- SimpleSet™ Field Programming
- Status Indicator Light
- Relay Outputs (minimum voltage drop in thermostat)
- Remote Sensor Compatible
- Ideally Suited for:
  – Residential (New Construction/Replacement)
  – Light Commercial

Programmable Electronic Thermostat (P/N 668811101)

7-Day Programmable, Auto Changeover, Fan Speed Control, Hardwired

- 7-Day Programmable
- Single Stage Heat Pump/Non-Heat Pump Systems
- Backlit Display
- Single Stage Heat/Cool Systems
- Field Calibration
- Auto Changeover
- Button Lockout Function
- Two Speed Fan Control
- SimpleSet™ Programming
- Remote Temperature Sensor Capability
- Title 24 Compliant / No Batteries Required
- Relay Outputs (minimum voltage drop in thermostat)
- Ideally Suited for:
  – Residential (New Construction/Replacement)
  – Light Commercial

Specifications–668811101

Electrical rating: • 24 VAC (18-30 VAC)
• 1 amp maximum per terminal
• 3 amp maximum total load

Temperature control range: 45°F to 90°F (7°C to 32°C) Accuracy: ± 1°F (± 0.5°C)

System configurations: 1-stage heat, 1-stage cool, heat pump

Timing: Anti-short Cycle: 5 minutes
Backlight Operation: 10 seconds

Terminations: C, RH, RC, W, Y, B, O G1, G2, S1, S2

For detailed installation, operation and application refer to Operation & Application Guide LIAF015

Non-Programmable Electronic Thermostat (P/N 668811001)

Non-Programmable, Auto Changeover, Fan Speed Control, Hardwired

- Single Stage Heat Pump/Non-Heat Pump Systems
- Backlit Display
- Single Stage Heat/Cool Systems
- Field Calibration
- Auto Changeover
- Button Lockout Function
- Two Speed Fan Control
- Remote Temperature Sensor Capability
- Title 24 Compliant / No Batteries Required
- Relay Outputs (minimum voltage drop in thermostat)
- Ideally Suited for:
  – Residential (New Construction/Replacement)
  – Light Commercial

Specifications–668811001

Electrical rating: • 24 VAC (18-30 VAC)
• 1 amp maximum per terminal
• 3 amp maximum total load

Temperature control range: 45°F to 90°F (7°C to 32°C) Accuracy: ± 1°F (± 0.5°C)

System configurations: 1-stage heat, 1-stage cool, heat pump

Timing: Anti-short Cycle: 5 minutes
Backlight Operation: 10 seconds

Terminations: C, RH, RC, W, Y, B, O G1, G2, S1, S2

For detailed installation, operation and application refer to Operation & Application Guide LIAF016

Wireless Temperature Control (T9000)

The T9000 Wireless Temperature Control is designed to provide precision temperature control without the installation labor and expense of wiring.

- Powered by AA batteries
- Mounts in any suitable location that will provide good temperature control.
- Large LCD display provides the user with current room temperature, set point temperature, time, program interval, and other system status information.

For detailed installation, operation refer to Operation & Maintenance Bulletin OM 897.

Programmable

Non-programmable

The second part of the T9000 system is called a Remote Control Node or “RCN”. An RCN interfaces with specific desired HVAC equipment, and communicates with its thermostat using unlicensed 900 MHz, radio frequency energy. At the time of installation, the T9000 thermostat is linked to one or more RCN controls. The thermostat and RCN that have been linked will not interfere with, or be affected by, any other thermostat or RCN in adjacent rooms, apartments, or neighboring homes.

Remote Control Node (RCN)

Used with the Wireless Temperature Control, the RCN interfaces with specific HVAC equipment, and communicates with its thermostat using unlicensed 900 MHz, radio frequency energy. Contact your local McQuay Representative for details.

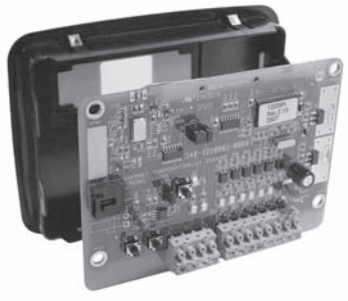
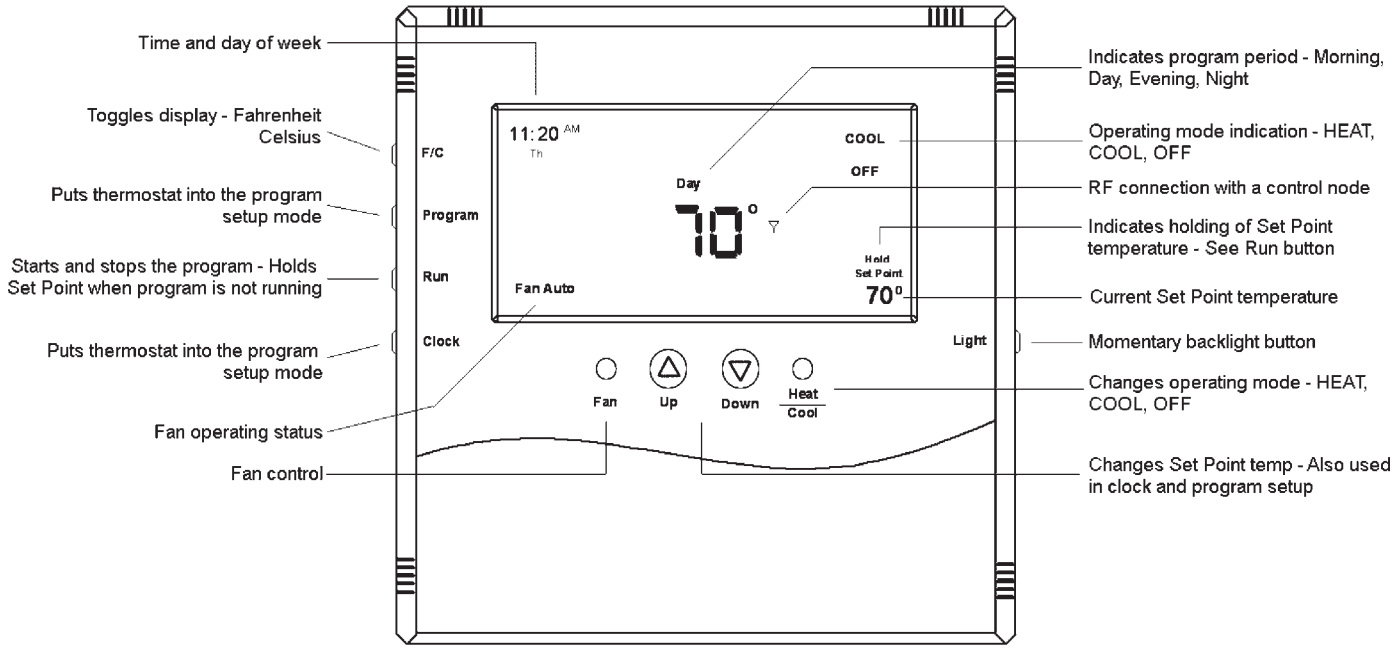


Figure 19. T9000 Overview



MicroTech III Wall-Mounted Room Temperature Sensors (Kit P/N 669529101, 669529201, 669529001)

Figure 20. MicroTech III Wall-Mounted Room Temperature Sensors (669529201 Not Shown)

Sensor 669529101
Sensor 669529201 Not Shown

Sensor 669529001

General

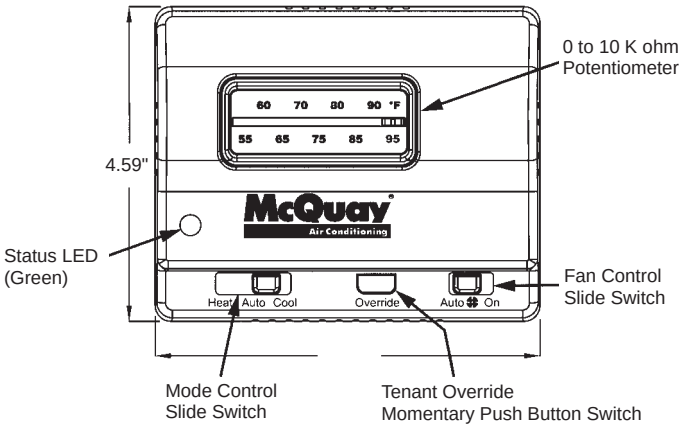
⚠ CAUTION

When the optional wall-mounted room temperature sensor is connected to the unit controller, the Return Air Temperature (RAT) sensor must not be installed. The wall-mounted room temperature sensor and return air sensor must not be connected simultaneously or the unit will not operate properly.

Microtech III Wall-Mounted Room Temperature Sensors provide electronic sensing of room temperatures at wall locations. All sensor models feature a thermistor (10kΩ) and a green LED for unit status. Tenant override, setpoint adjustment potentiometer, thermometer, and a communications port are optional features available in any combination

This manual provides general information for the Microtech III Wall-Mounted Room Temperature Sensors. For installation instructions refer to IM 955

Figure 21. MicroTech III Wall Sensor Details



Specifications

Thermistor resistance (10kΩ)
(Conforms to advance thermal products curve 2)

Ambient Temperature Limits:

Shipping and Storage: 40°F to 160°F (–40°C to 71°C)

Operating: 40°F to 140°F (4°C to 60°C)

Humidity: 5 to 95% RH, non-condensing

Locations: NEMA Type 1, Indoor only

Connections: Color Coded Leads

Wiring Sensors to the MicroTech III Unit Controller

Figure 22. Temperature Sensor Wiring to MicroTech III Unit Controller (Kit Part No.s 669529101, 669529201)

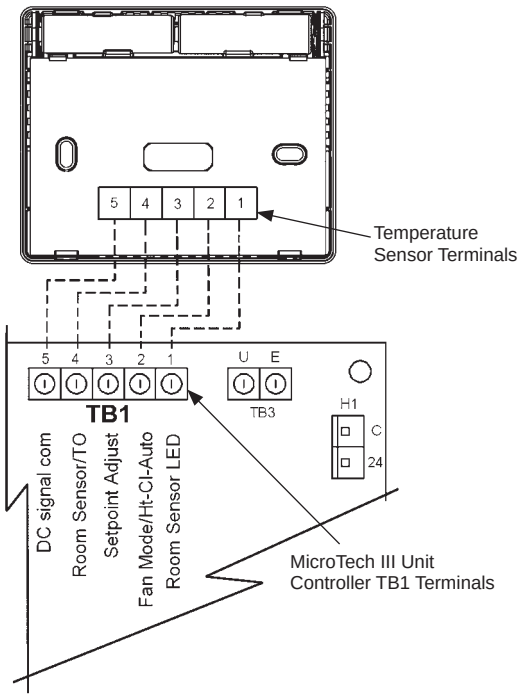
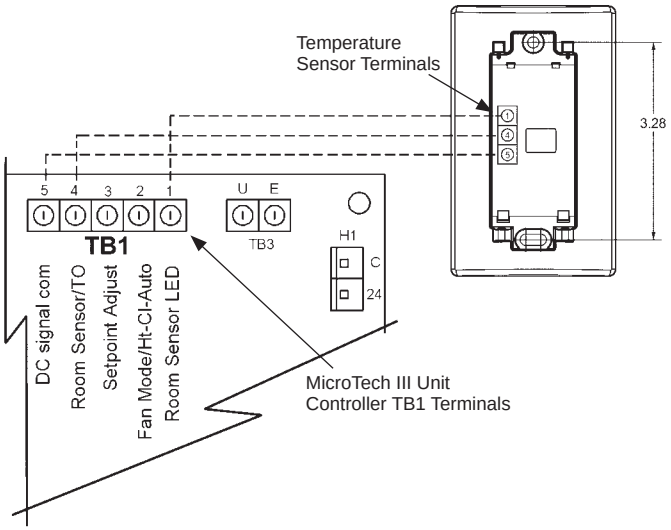


Figure 22. Temperature Sensor Wiring to MicroTech III Unit Controller (669529001)



Optional Remote Sensor (P/N 66720401)

The fast, easy solution for temperature sensing problems.

- For tamper prone areas
- Poor airflow areas
- Troubled applications
- Foam gasket prevents drafts through wall opening
- Mounts to standard 2" x 4" outlet box
- 2¾"W x 4½"H

1. Remove cover from remote sensor housing.
2. Select an appropriate location for mounting the remote sensor.
3. Mount remote sensor unit using hardware provided.
4. Install two strand shielded wire between remote sensor and thermostat. Shielded wire must be used.

Do not run remote sensor wire in conduit with other wires.

- Wire 1 should run between the S1 terminal on the thermostat and the S1 terminal on the remote sensor
- Wire 2 should run between the S2 terminal on the thermostat and the S2 terminal on the remote sensor
- Connect the shielding of the wire to the S2 terminal on the thermostat

5. Disable the main sensor (R12) on the thermostat by cutting it from the circuit board.

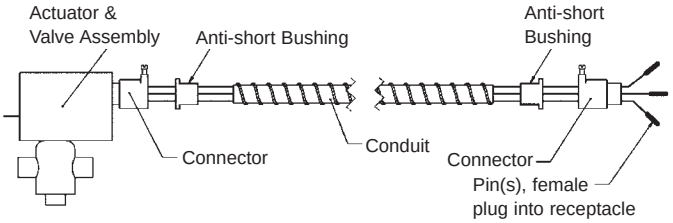
Motorized Isolation Valve & Relay

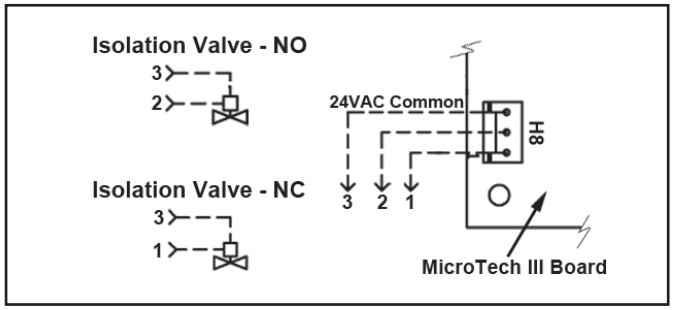
The motorized valve kit may be ordered as a field-installed accessory.

Wired as shown in Figure 23, the motorized valve will open on a call for compressor operation. Valves for unit sizes 007 to 018 are 1/2".

Using a Normally Closed (N/C), power open valve, wire as illustrated in Figure 23.

Figure 23. Normally Closed, Power Open Motorized Valve Wiring





***Note:** Connectors on valve must be cut off and stripped back and the wires twisted to make connections to the IV/PR Terminals*

Pump Restart Relay Kit P/N 061419001

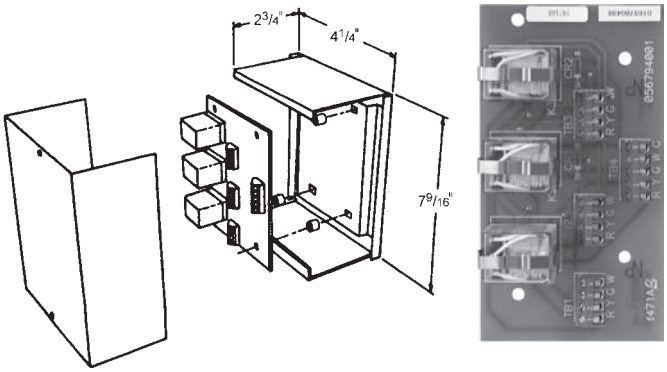
The MicroTech III unit controller has an internal Pump Restart Relay connected to H8, Pin 2 for the Normally Open (N/O) terminal of the internal relay.

Connect to H8, Pin 1 for the Normally Closed (N/C) terminal of the internal relay.

The output of the internal pump restart relay is 24-volts AC and the output is not available when the H8 connection is used to control a motorized valve.

Multiple Unit Control Panel (MUCP) for Use With MicroTech® III Unit Controller

For detailed installation instructions refer to IM 952



The Multiple Unit Control Panel (MUCP) is an accessory used when up to 3-units are controlled from a single thermostat. Console units must have the MUCP field-installed in a remote location, typically close to the units and convenient for service access.

A maximum of 2 boards may be used together if up to 6-units must be connected and controlled from a single thermostat.

***Note:** The MUCP control board does not fit inside the console unit control box.*
Multi-speed operation is only available with the optional unit-mounted fan speed switch.

The multiple unit control board provides the components necessary to protect the MicroTech III unit controller from electrical damage that may occur when using standard off-the-shelf relays.

This version of the board uses VAC relays and should not be used in combination with any other accessories or equipment that require VDC connections to the “G”, “W1”, or “Y1” terminals (i.e. Boilerless System Kit).

Outside Air Damper – Field-installed Option

⚠ CAUTION

To prevent infiltration of ambient conditions, it is the responsibility of the contractor to assure that factory installed gasketing matches up with the wall opening, or that additional material is used to assure a positive seal.

Cold Weather Operation

Console water source heat pumps may experience erratic operation during cold ambient conditions with the outside air damper in the open position. See "Operating Limits," pages 13 and 14, for guidelines.

Figure 24. Manual Outside Air Damper Assembly (See IM 974 for detailed installation instructions)

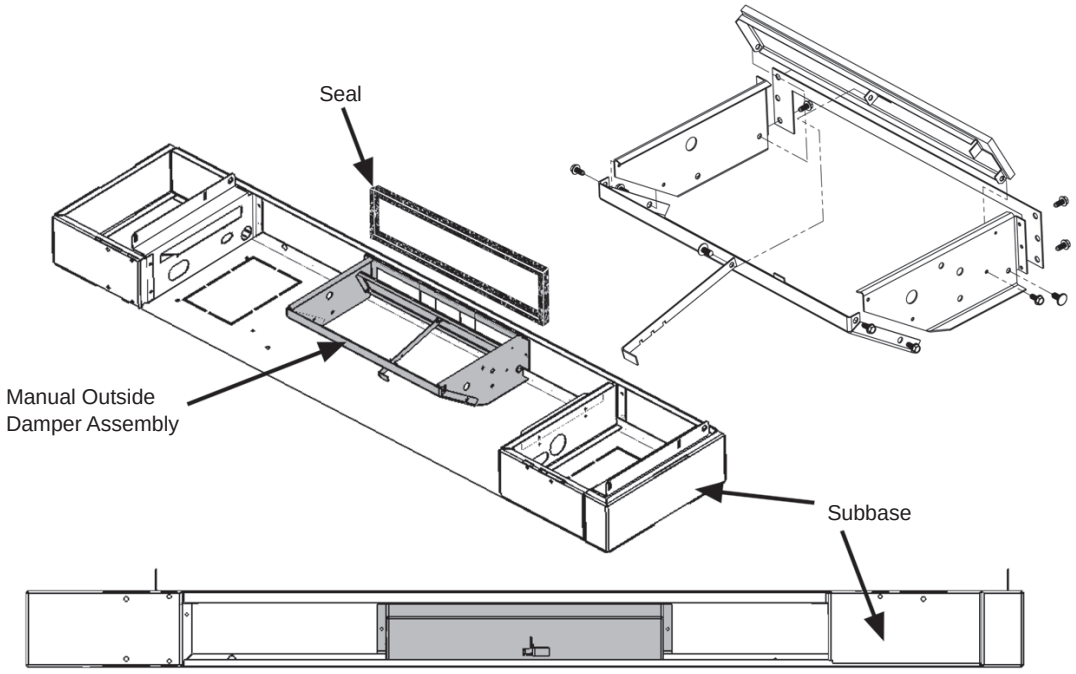
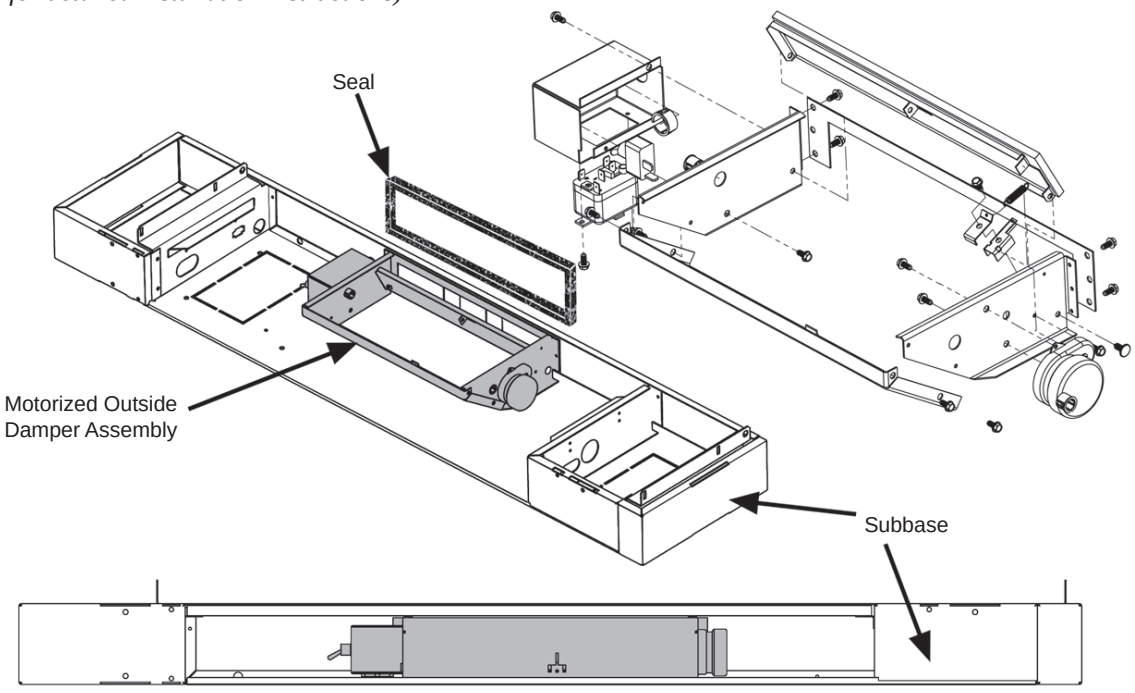


Figure 25. Motorized Outside Air Damper Assembly (See IM 974 for detailed installation instructions)



Troubleshooting

The in and outs of R-410A

R-410A is a non-ozone depleting blend of two refrigerants - HFC-125 and HFC-32 in a fifty percent mixture. R-410A exhibits higher operating pressure and refrigeration capacity than R-22. R-410A is intended for use in new air conditioning applications that have traditionally used HCFC-22 (R-22). Due to higher capacity and pressure of R-410A, it must not be used in existing R-22 systems.

Although R-410A is non-flammable at ambient temperature and atmospheric pressure, it can become combustible under pressure when mixed with air.

Note: *R-410A should not be mixed with air under pressure for leak testing. Pressure mixtures of dry nitrogen and R-410A can be used for leak testing.*

Lubrication

R-410A should be used only with polyester (POE) oil. The HFC refrigerant components in R-410A will not be compatible with mineral oil or alkylbenzene lubricants. R-410A systems will be charged with the OEM recommended lubricant, ready for use with R-410A.

Charging

Due to the zeotropic nature of R-410A, it should be charged as a liquid. In situations where vapor is normally charged into a system, a valve should be installed in the charging line to flash the liquid to vapor while charging.

Make certain that the recycle or recovery equipment used is designed for R-410A. The pressure of R-410A refrigerant is approximately 60 percent greater than that of R-22. Pressure gauges require a range up to 800 PSIG high side and 250 PSIG low side. Recovery cylinders require a 400 PSIG rating – do not put R-410A in a 300 PSIG rated cylinder.

⚠ WARNING

Recycle/recovery equipment must be designated for R-410A. R-410A pressure is greater than R-22. Improper equipment can cause severe injury or death.

Note: *Because a water source heat pump operates under a wide range of water and air temperatures, the values printed below are to be taken as suggested pressure and temperatures. All McQuay water source heat pumps are designed for commercial use. The units are designed for the cooling mode of operation and fail safe to cooling. The reversing valve is energized for the heating mode of operation.*

Superheat	Head Pressure	Water Delta T
8 to 14 degrees	335-355 PSIG	10° to 14°

All information above is based on ISO standard 13256-1 and tested at these conditions.

General Maintenance

1. Normal maintenance on all units is generally limited to filter changes. Units are provided with permanently lubricated motors and require no oiling even though oil caps may be provided.

2. Filter changes are required at regular intervals. The time period between changes will depend upon the project requirements. Some applications such as motels produce a lot of lint from carpeting and linen changes, and will require more frequent filter changes. Check filters at 60-day intervals for the first year until experience is acquired. If light cannot be seen through the filter when held up to sunlight or a bright light, it should be changed. A more critical standard may be desirable.

3. The condensate drain pan should be checked annually and cleaned and flushed as required.

4. Record performance measurements of volts, amps, and water temperature differences (both heating and cooling). A comparison of logged data with start-up and other annual data is useful as an indicator of general equipment condition.

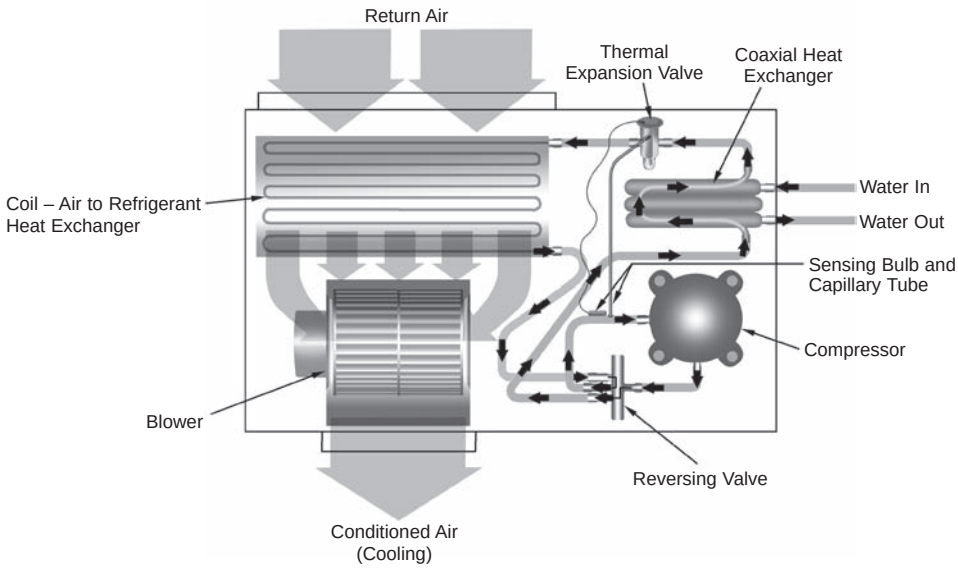
5. Periodic lockouts almost always are caused by air or water problems. The lockout (shutdown) of the unit is a normal protective result. Check for dirt in the water system, water flow rates, water temperatures, airflow rates (may be a dirty filter), and air temperatures. If the lockout occurs in the morning following a return from night setback, entering air below machine limits may be the cause.

Troubleshooting Refrigeration Circuit

Symptom	Head Pressure	Suction Pressure	Compressor Amp Draw	Super Heat	Subcooling	Air Temp Differential	Water (loops) Temp Differential	Safety Lock Out
Charge Undercharge System (Possible Leak)	Low	Low	Low	High	Low	Low	Low	Low Pressure
Overcharge System	High	High	High	Normal	High	Normal / Low	Normal	High Pressure
Low Air Flow Heating	High	High	High	High / Normal	Low	High	Low	High Pressure
Low Air Flow Cooling	Low	Low	Low	Low / Normal	High	High	Low	Low Temp
Low Water Flow Heating	Low / Normal	Low / Normal	Low	Low	High	Low	High	Low Temp
Low Water Flow Cooling	High	High	High	High	Low	Low	High	High Pressure
High Air Flow Heating	Low	Low	Low	Low	High	Low	Low	Low Temp
High Air Flow Cooling	Low	High	Normal	High	Low	Low	Normal	High Pressure
High Water Flow Heating	Normal	Low	Normal	High	Normal	Normal	Low	High Pressure
High Water Flow Cooling	Low	Low	Low	Low	High	Normal	Low	Low Temp
TXV Restricted	High	Low	Normal / Low	High	High	Low	Low	

Typical Cooling and Heating Refrigeration Cycles

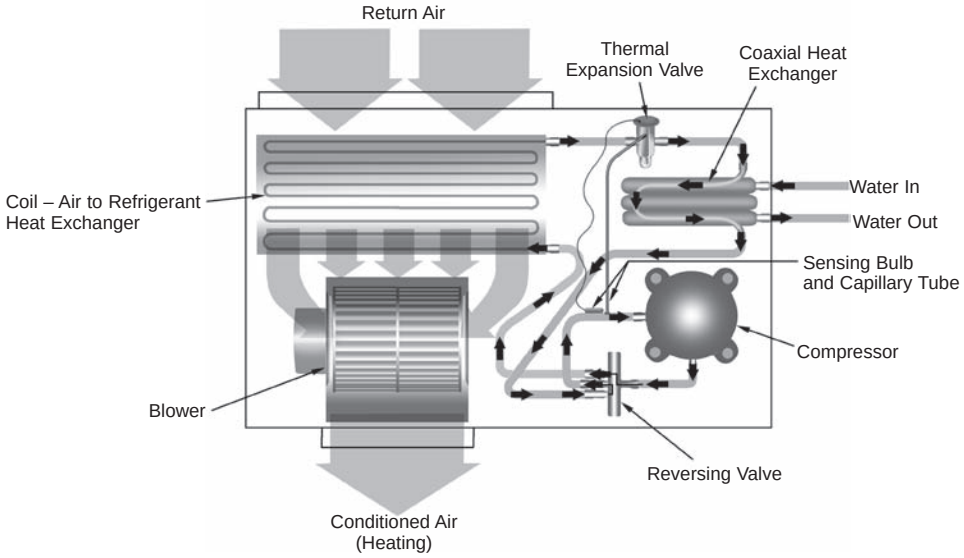
Figure 26. Cooling Mode



Cooling Refrigeration Cycle

When the wall thermostat is calling for COOLING, the reversing valve directs the flow of the refrigerant, a hot gas, leaving the compressor, to the water-to-refrigerant heat exchanger. Here the heat is removed by the water and the hot gas condenses to become a liquid. The liquid then flows through a thermal expansion metering system to the air-to-refrigerant heat exchanger coil. The liquid then evaporates becoming a gas, at the same time absorbing heat and cooling the air passing over the surfaces of the coil. The refrigerant then flows as a low pressure gas through the reversing valve and back to the suction side of the compressor to complete the cycle.

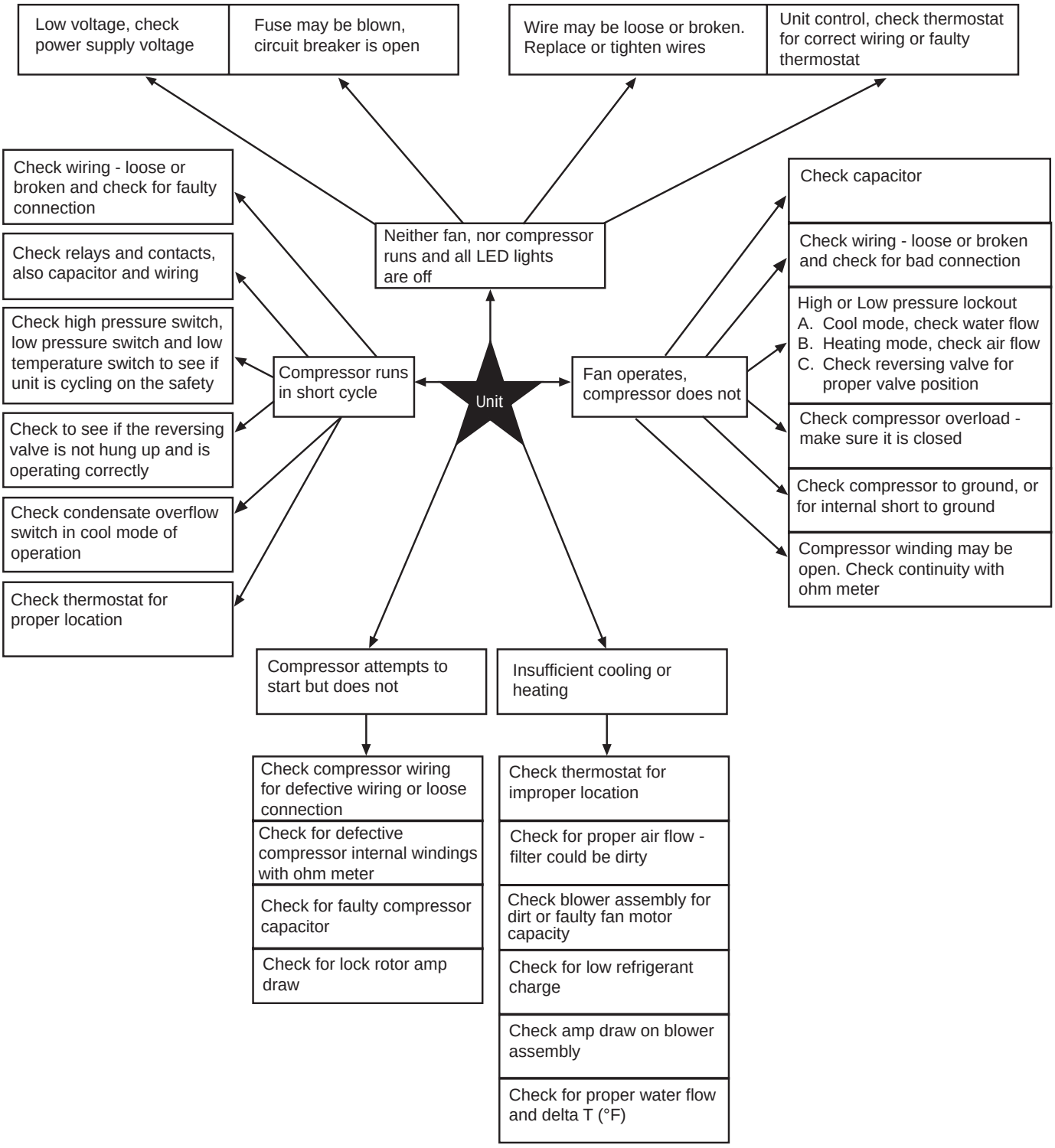
Figure 27. Heating Mode



Heating Refrigeration Cycle

When the wall thermostat is calling for HEATING, the reversing valve directs the flow of the refrigerant, a hot gas, leaving the compressor, to the air-to-refrigerant heat exchanger coil. Here the heat is removed by the air passing over the surfaces of the coil and the hot gas condenses to become a liquid. The liquid then flows through a capillary thermal expansion metering system to the water-to-refrigerant heat exchanger. The liquid then evaporates becoming a gas, at the same time absorbing heat and cooling the water. The refrigerant then flows as a low pressure gas through the reversing valve and back to the suction side of the compressor to complete the cycle.

Figure 28. Troubleshooting Guide - Unit Operation


Low voltage, check power supply voltage
Fuse may be blown, circuit breaker is open
Wire may be loose or broken. Replace or tighten wires
Unit control, check thermostat for correct wiring or faulty thermostat
Check wiring - loose or broken and check for faulty connection
Check relays and contacts, also capacitor and wiring
Check high pressure switch, low pressure switch and low temperature switch to see if unit is cycling on the safety
Check to see if the reversing valve is not hung up and is operating correctly
Check condensate overflow switch in cool mode of operation
Check thermostat for proper location
Neither fan, nor compressor runs and all LED lights are off
Compressor runs in short cycle
Unit
Fan operates, compressor does not
Check capacitor
Check wiring - loose or broken and check for bad connection
High or Low pressure lockout
A. Cool mode, check water flow
B. Heating mode, check air flow
C. Check reversing valve for proper valve position
Check compressor overload - make sure it is closed
Check compressor to ground, or for internal short to ground
Compressor winding may be open. Check continuity with ohm meter
Compressor attempts to start but does not
Insufficient cooling or heating
Check compressor wiring for defective wiring or loose connection
Check for defective compressor internal windings with ohm meter
Check for faulty compressor capacitor
Check for lock rotor amp draw
Check thermostat for improper location
Check for proper air flow - filter could be dirty
Check blower assembly for dirt or faulty fan motor capacity
Check for low refrigerant charge
Check amp draw on blower assembly
Check for proper water flow and delta T (°F)

Troubleshooting the MicroTech III Unit Controller

⚠ DANGER

To avoid electrical shock, personal injury or death, be sure that field wiring complies with local and national fire, safety, and electrical codes, and voltage to the system is within the limits shown in the job-specific drawings and unit electrical data plate(s).

Power supply to unit must be disconnected when making field connections. To avoid electrical shock, personal injury or death, be sure to rigorously adhere to field wiring procedures regarding proper lockout and tagout of components.

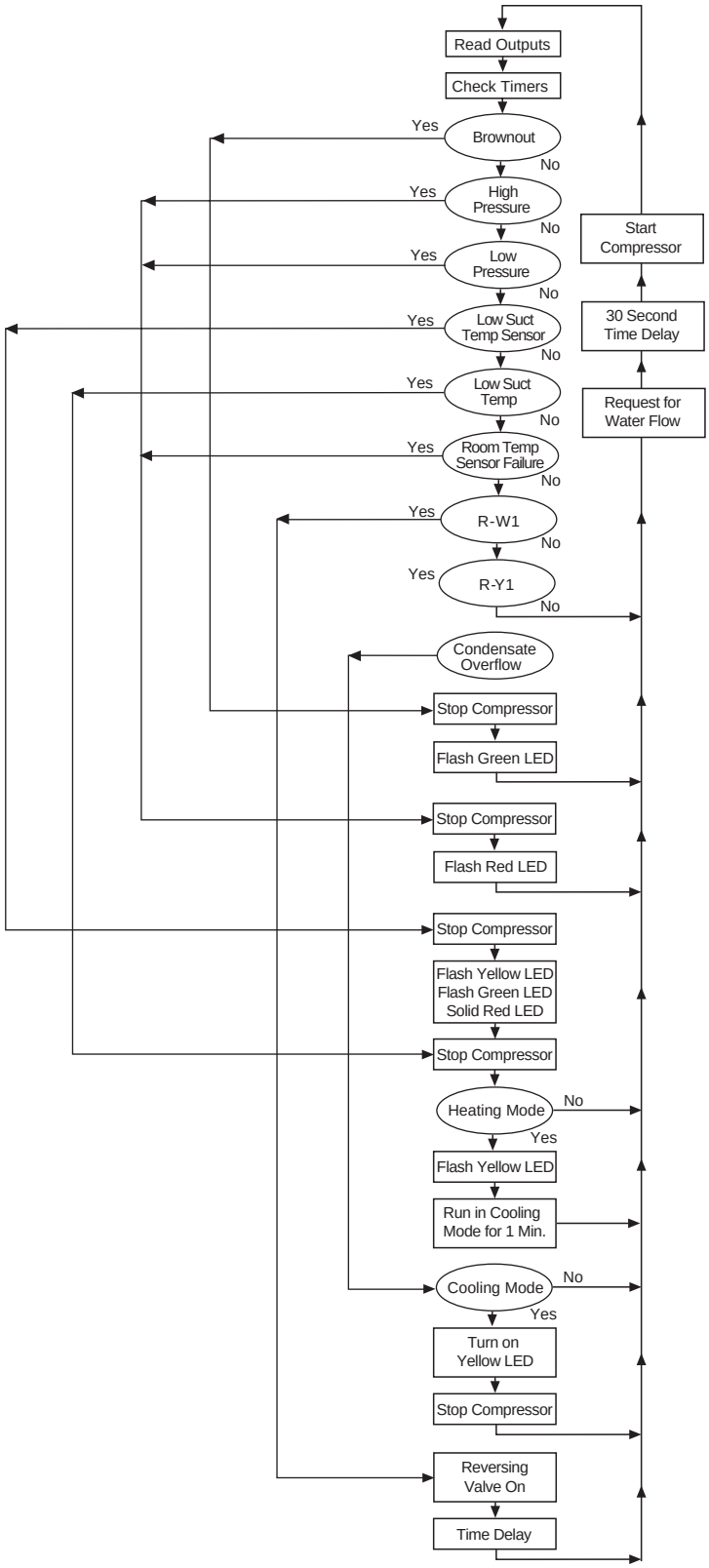
General Use and Information

The Microtech III unit controller is provided with two drive terminals, R(24VAC) and C(0 VAC) that can be used by the end user to drive the thermostat inputs (G, Y1, Y2, W1, and W2) and control inputs (U, E, and O). Any combination of a single board drive terminal (R or C) may be used to operate the MicroTech III unit controller's control or thermostat inputs. However, only one drive terminal (R or C) can be connected to any individual input terminal or damage may result. Some control inputs are not accessible to the end user (for example, HP, LP, SLTS, and COF).

Typically the Microtech III unit controller's R (24VAC) terminal is used to drive the board's thermostat inputs and control inputs by connecting it to the R terminal of an industry standard thermostat. The control outputs of the standard thermostat are then connected to the Microtech III unit controller thermostat inputs and control inputs as needed. Any remaining board input(s) may be operated by additional thermostat outputs or remote relays (dry contacts only).

All Microtech III unit controller inputs must be operated by dry contacts powered by the control board's power terminals. No solid state devices (Triacs) may be used to operate the Microtech III unit controller inputs. No outside power source may be used to operate the Microtech III unit controller inputs.

Figure 29. MicroTech III Unit Controller LED Status and Faults Troubleshooting Reference



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